



Cardiff Council 2022 Air Quality Progress Report

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

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Executive Summary: Air Quality in Our Area

What has become distinctly apparent is that air Pollution is a local and national problem. Long-term exposure reduces life expectancy by increasing mortality, as well as increasing morbidity risks from heart disease and strokes, respiratory diseases, lung cancer and other effects.

What we know is that poor air quality in Wales poses as a significant concern for Public Health, regarded as the most significant environmental determinant of health. Its associated adverse risk to public health is particularly prevalent within urban areas and near major roads. The pollutants of primary concern for public health are particulate matter and primary/ secondary derived nitrogen dioxide (NO₂). Both pollutants primarily originate from motor vehicles.

The UK expert Committee on the Medical Effects of Air Pollution (COMEAP) estimates that air pollution is responsible for “an effect equivalent of between 28,000 and 36,000 deaths (at typical ages) each year”¹. This does not mean there are ‘actual’ deaths from air pollution exposure; rather, that the reduced life expectancy which everyone experiences because of air pollution exposure (6-8 months on average but could range from days to years) is ‘equivalent’ to between 28,000 and 36,000 deaths when summed. In Wales, based on the latest data available (for 2017)², Public Health Wales estimates the burden of long-term air pollution exposure to be the equivalent of 1,000 to 1,400 deaths (at typical ages) each year.

Examining the most recent datasets (2017) made available by Public Health Wales for the total number of all-cause non-accidental deaths registered in the Cardiff and Vale University Health Board area, the long-term mortality burden attributable

¹ COMEAP (2018). Associations of long-term average concentrations of nitrogen dioxide with mortality.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/734799/COMEAP_NO2_Report.pdf

² Welsh Government StatsWales. <https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Air-Quality/airqualityindicators>

to air pollution (fine particulate matter and nitrogen dioxide combined) is an estimated effect equivalent to 178- 227 deaths.

Despite the efforts made by national government and local authorities there is an apparent disconnection between air quality management and Public Health. The status of Air quality management in Wales focuses upon a hotspot approach and fails to reference other factors such as socioeconomic status or exposure to other environmental determinants of health.

Fundamentally, it is plausible that air pollution affects everyone to some extent. Whilst the legislative air quality limit values are based on epidemiological evidence and are ultimately intended to protect public health, there is also recognition that health effects may be experienced below these thresholds for some of the key pollutants (e.g. PM_{2.5} and NO₂), particularly affecting most susceptible groups: young children, the elderly and those with pre-existing health conditions and comorbidities. Acknowledged as the triple jeopardy concept- air pollution combines with other aspects of the social and physical environment to create an inequitable disease burden on more deprived parts of society; populations of areas with low socioeconomic status are prone to exacerbated effects from exposure to air pollution, in part as they are more likely to suffer pre-existing health conditions as a result of their poorer living conditions and lifestyle, but also as they are more vulnerable, being more likely to be living in areas with higher levels of air pollution.

Air Quality in Cardiff Council

Local authorities have a statutory duty under Part IV of the Environment Act 1995 & Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 to manage local air quality. Under Section 82 of the Environment Act 1995 the Local Air Quality Management (LAQM) process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not air quality objectives are likely to be achieved.

The air quality objectives applicable to LAQM in Wales are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138) and Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298). Where the air quality reviews indicate that the air quality objectives may not be met the local authority is required

to designate an Air Quality Management Area (AQMA). Action must then be taken at a local level and outlined in a specific Air Quality Action Plan (AQAP) to ensure that air quality in the identified area improves.

In line with the Cardiff Council's (CC) statutory duties under Part IV of the Environment Act 1995, Shared Regulatory Services (SRS) on behalf of CC undertakes regular air quality monitoring at specifically allocated locations across Cardiff using automated and non-automated principles for ambient air Nitrogen Dioxide (NO₂), Particulate Matter (PM₁₀ & PM_{2.5}), Sulphur Dioxide (SO₂), Carbon Monoxide (CO) & Ozone (O₃).

With regards to prioritising ambient air quality sampling locations, the Council adopts a risk-based approach to any allocation of monitoring sites, considering the requirements of The Department for Environment, Food and Rural Affairs' (Defra) Local Air Quality Management Technical Guidance 16 (TG16), April 2021. The designated monitoring locations are assigned based on relevant exposure and where the certain Air Quality Objective levels for a particular pollutant applies. TG16 states that annual mean objectives should apply at "All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, car homes etc."

Monitoring Networks

In 2021, Cardiff had four automatic air quality monitoring sites, equivalent to Automated Urban Rural Network (AURN) standards, located at Frederick Street in the City Centre, Richard's Terrace, just off Newport Road, Castle Street and Lakeside Primary School.

Cardiff Frederick Street (Urban Background)- AURN 1

The site monitors on a 24/7 basis measuring levels of NO₂, PM₁₀ & PM_{2.5}, SO₂, CO and O₃ feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

Richard's Terrace, Newport Road (Urban Traffic)- AURN 2

The site monitors on a 24/7 basis measuring levels of NO₂ & PM₁₀ at that location, feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

Cardiff Castle Street (Urban Traffic/ Roadside)

Commissioned in October 2020 with the financial support of Welsh Government. The site monitors on a 24/7 basis measuring levels NO₂, PM₁₀ & PM_{2.5} at that location, forming part of the Welsh Air Quality Network.

Cardiff Lakeside (Urban Background)

The site monitors on a 24/7 basis measuring levels of Polycyclic aromatic hydrocarbons (PAH) at that location, feeding data directly into Defra's PAH Digital (solid phase) Network. SRS serve as a local site operator to this site, however data interpretation is sanctioned by the consultants Ricardo Energy and Environment Ltd, whereby concentrations are compared to the national air quality objective for B[a]P in ambient air, based on an annual mean concentration of 0.25 ng/m³. Details can be found in the [UK Air Quality Strategy \(Defra, 2007\)](#). Therefore, the purpose of this site and results derived are not corresponded to any of the limit values outlined for the purposes of LAQM in Wales.

Summarised results for various pollutants for the outlined automatic monitoring stations can be found at <http://www.welshairquality.co.uk> & <https://uk-air.defra.gov.uk/interactive-map>

AQ Mesh Analysers

In addition to the newly commissioned automated monitoring station on Castle Street, Cardiff Council has acquired the use of 7 near real time indicative air quality analysers. 5 analysers were purchased with the financial support of Welsh Government and the 6th & 7th analysers were facilitated by the SRS who had successfully accrued funding via a S106 planning contribution. The analysers have been specifically placed and represent relevant exposure. The monitors are located at the following locations:

Clean Air Monitors

- Westgate Street;
- Lower Cathedral Road;
- Tudor Street;
- North Road; and
- Penarth Road

S106 Monitors

- Llandaff – Bridge Street; and

- Canton – Lansdowne Rd (installed 2021).

The analysers continuously monitor for Nitric Oxide, Nitrogen Dioxide & Ozone, PM10 & PM2.5, and do so every 15 minutes (data uploaded every hour). Information regarding the specification of the monitors can be viewed at <https://www.aqmesh.com/product/>. These monitors do not form part of the regulated Welsh automated monitoring network, but as specified they are an indicative form of monitoring and a useful tool to look at datasets on a high-resolution basis. The results captured from these monitors are summarised below

Site Name	Valid Data Capture 2021 %	NO ₂ Annual Mean Concentration (µg/m ³)	PM ₁₀ Annual Mean Concentration (µg/m ³)	PM _{2.5} Annual Mean Concentration (µg/m ³)
Westgate Street*	0	N/A	N/A	N/A
Lower Cathedral Road	100	19.9	11.1	8.5
Tudor Street	100	20	13.9	10.7
North Road	100	22.1	9.5	7.8
Penarth Road	100	12.7	11.5	9.5
Lansdowne Road, Canton**	54	25.6	16.6	11.4
Llandaff AQMA	11	12	9.3	20.72

*Westgate Street Monitor suffered numerous technical issues which has meant data capture for 2021 was not valid. Instrument has been fully recommissioned in 2022. Similarly, technical issues were suffered with the Llandaff Monitor, resulting in poor data capture in 2021.

** -data capture representative of period monitored was installed.

Non-automatic Monitoring Sites

In 2021 there were 113 specifically allocated non automatic monitoring sites across Cardiff which monitored levels of nitrogen dioxide (NO₂). These sites are supported and maintained by SRS on behalf of CC. The non-automatic sites do not provide live data; instead they consist of diffusion tubes which are placed at

each of the sites, collected and replaced on a rolling monthly basis. The results derived from the tube sampling are then averaged over the year to enable a comparison of the results against the annual average (**40µg/m³**) and 1-hour (**200µg/m³ not to be exceeded > 18 times per year**) air quality objectives for NO₂.

Summary of results collated in 2021

Automated monitoring- Results highlighted in **Section 2.2** of this report indicate compliance with the relevant air quality standards applicable for the purpose of LAQM in Wales.

Non- automated monitoring- In 2021, compliance with the set annual average objective for NO₂ (40µg/m³) was achieved at all monitored locations. The results are indicative that the levels of air pollution were still being influenced from the ongoing impacts of the COVID lockdown restrictions that were in place in the first part of 2021 and have had an impact on pollution levels in Cardiff which is likely owing to traffic volumes having decreased. However, it is evident that concentrations have increased compared to the results in 2020 and this is likely reflective of the easing of restrictions throughout 2021 and increased travel patterns. It is therefore likely that the concentrations recorded in 2021 were still not fully representative of a business-as-usual scenario and the results have generated a small bias/ underestimation of levels of pollution across Cardiff in 2021.

In accordance with Welsh Government's (WG) Local Air Quality Management Policy Guidance, July 2017, SRS and CC recognise that there is no defined "safe level" when describing levels of air quality. Although compliant levels were achieved at all monitored locations in 2021, subsequently as a result of COVID-19 impacts, Cardiff Council remains vigilant and will work towards sustaining/improving these levels of compliance across the city for future years.

Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when air quality is close to or above an acceptable level of pollution, known as the air quality standard/objective

Based on monitoring results and further detailed assessments, there are currently four Air Quality Management Areas (AQMAs) declared across Cardiff which have

all been declared due to exceedances of the annual mean NO₂ Air Quality Standard (40µg/m³), known to be predominantly derived from road transport sources.

1. **Cardiff City Centre**- declared 1st April 2013
2. **Llandaff**- declared 1st April 2013
3. **Stephenson Court**- declared 1st December 2010
4. **Ely Bridge**- declared 1st Feb 2007

Maps detailing the extend and fully boundaries of the 4 AQMAs are provided in Appendix D.

Actions to Improve Air Quality

SRS and CC are very aware of the concerns for air quality impacts. SRS & CC is committed to achieving levels as low as reasonably practicable by demonstrating levels beyond the annual objectives set for pollutants. In order to improve the air quality in Cardiff, action needs to be taken across the city as a whole. The main air pollutants which cause a public health concern and primarily worsen air quality in Cardiff are particulate matter and primary/ secondary derived nitrogen dioxide (NO₂), derived by transport vehicles.

Welsh Government's publication; Local Air Quality Management, Policy Guidance, June 2017 recommended two clear goals:

- (1) achieve compliance with the national air quality objectives in specific hotspots; and
- (2) reduce exposure to pollution more widely, so as to achieve the greatest public health benefit.

Collective efforts, therefore, should look beyond targeted action in localised air pollution hotspots and do this in parallel with universal action to reduce risks for everyone.

Section 84 of the Environment Act 1995 ensures that action must then be taken at a local level which is outlined in a specific Air Quality Action Plan (AQAP) to ensure that air quality in the identified area improves. After declaring an AQMA

the authority must prepare a **DRAFT** Air Quality Action Plan (AQAP) within 18 months setting out measures it intends to put in place to improve air quality to at least the air quality objectives, if not even better. The AQAP must be **formally** adopted prior to 24 months has elapsed. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

In view of the statutory obligation to produce an AQAP for each AQMA, in 2019 SRS & CC developed a citywide Clean Air Strategy & Action Plan (CASAP) for Cardiff. The strategy is an evolving document and coincides with Cardiff's Capital Ambition report, helping to implement and deliver the priorities outlined in the Ambition report with an overarching aim to improve air quality to protect and improve public health in Cardiff. The CAS & Action Plan appoints strategic measures that will look to generate a positive impact to citywide air quality levels, in particular traffic derived NO₂ levels. Each measure has endured a cost benefit appraisal procedure by weighting the measures in terms of air quality impact, cost and timescale. The key theme of the strategic measures is to increase the uptake of sustainable modes of transport by influencing a behavioural change in Cardiff. The CASAP fulfils the requirements of the LAQM process to produce an Air Quality Action Plan (AQAP).

It will be imperative that the CASAP is reviewed following the full implementation of the Clean Air Plan in order to further prioritise measures, to ensure air quality levels are continuously improved in Cardiff. Therefore, it is likely that the CASAP will need a full review and update in 2023/24

Local Priorities and Challenges

Clean Air Plan

In addition to Cardiff's 4 AQMAs and CASAP work, following the formal publication of Defra's UK detailed air quality plan to tackle roadside nitrogen dioxide (NO₂) concentrations in July 2017, it was identified from air quality monitoring undertaken by Cardiff Council (CC) and modelled projections from WG that Cardiff would continue to exceed EU & UK Air Quality Directive Limit Values for NO₂ beyond 2020. The report detailed modelled projections from the Joint Air

Quality Unit (JAQU) which showed continued non-compliance of the national annual average NO₂ standard by 2021 along identified road networks. The roads which have been modelled as exceeding the annual limit value are the A4161, the A4232, the A4234, the A470 and the A48. These areas of exceedence are also featured in the CAS & Action Plan document as any mitigation measures implemented on the referenced road links will have an impact on the LAQM AQMAs.

As a result of the detail in the UK Plan, and a subsequent High Court ruling, in March 2018, under Part IV of the Environment Act 1995, Section 85(7), WG issued a formal direction to CC to address its air quality concerns, with particular reference to the specified 5 road links. The direction has been governed by the Welsh Minister for Environment who has determined that the direction deemed necessary to meet obligations placed upon the United Kingdom under the **EU Ambient Air Quality Directive (2008/50/EC)**.

The Direction specified that CC had to undertake a feasibility study in accordance with the HM Treasury's Green Book approach, to identify the option which will deliver compliance with legal limits for nitrogen dioxide in the area for which the authority is responsible, **in the shortest possible time**.

Cardiff Council has developed a Clean Air Project Team who have met the necessary reporting requirements outlined by the Direction.

The results of the local modelling presented in the Initial Plan, differed to that undertaken by Defra using the Pollution Climate Mapping model. Defra's modelling identified two road links under baseline conditions which were projected to show non-compliance beyond 2021, namely the A48 and the A4232. The localised modelling identified only one road link under baseline conditions projected to show non-compliance beyond 2021, this being the A4161 Castle Street, in the City Centre.

Within the Initial Plan Report a long list of measures developed from the CASAP were qualitatively assessed against a primary objective of achieving compliance with set air quality objectives in the shortest possible time. The measures were considered against secondary objectives and were subjected to further qualitative assessments against the WeITAG Well-being Aspects.

The Council's published [Full Business Case](#) (Final Clean Air Plan) documents early intervention measures as well as aspired measures the Council are endorsing to improve localised air quality on the outlined A4161 Castle Street with a vision of improving citywide air quality levels. These measures include;

- Implementation of Electric Buses – 36 Electric Buses to be implemented on a number of routes within the City Centre;
- Bus Retro Fitting Programme;
- Taxi Mitigation Scheme;
- City Centre Transportation Improvements; and
- Active Travel Measures.

The Clean Air Plan initially demonstrated that the outlined package demonstrates the greatest level of compliance on Castle Street, with $31.9\mu\text{g}/\text{m}^3$ forecasted in 2021 as a result of the implementation of the measures. In addition to achieving compliance on Castle Street, the impact of the package of measures was also been modelled at local air quality monitoring locations, including those locations within existing Air Quality Management Areas (AQMAs). The results of the modelling indicated that all monitoring locations are expected to have concentrations below the $40\mu\text{g}/\text{m}^3$ which further demonstrates that the package of measures will improve local air quality including within existing AQMAs.

A key component of the Clean Air Plan to deliver compliance was the full implementation of the City Centre Schemes, particularly the City Centre North (Castle Street) Scheme. The schemes would establish a high quality active travel infrastructure for the city and improve connectivity between key developments by strategically aligning bus routes and enhancing links with the new Transport Interchange. These schemes were due to commence in early 2020, prior to the onset of the COVID pandemic.

In June 2021 Cabinet approved the construction of the original City Centre North Scheme as detailed in the Clean Air Plan, albeit on an interim basis. The decision to install the scheme as an interim measure was done so on the basis it would be necessary to assess any residual impacts following a full post Covid recovery

period, to ensure that no detrimental impacts in terms of congestion and air quality would emerge.

Following implementation of the interim scheme the Council has maintained regular monitoring and assessment of traffic and air quality impacts on Castle Street to demonstrate that compliance is being maintained on Castle Street.

Constant dialogue and ongoing collaboration with Welsh Government officials has been to ensure that the Plan remains on course to deliver compliance in the shortest possible time.

In order to formalise a time period to bring forward a permanent scheme on Castle Street, the Welsh Government have issued the Council with a further legal direction under Part IV of the Environment Act 1995.³ This direction sets on measures the Council needs to implement to ensure that compliance for the NO₂ limit value on Castle Street is maintained.

Electric Buses

Cardiff Bus procured 36 EV buses Cardiff Council has been successful in supporting the transition of buses on the Cardiff network to becoming fully electric. Cardiff Bus were enabled to introduce 36 new electric buses into their fleet from January 2022. It was delivered through a collaboration between Cardiff Bus and Cardiff Council after a successful bid for funding from the Department for Transport's (DfT) Ultra-Low Emissions Bus (ULEB) Scheme that received funding of £5.7m

Bus Retrofit Scheme

Following an open application process which ended on the 31st December 2020, and subsequent review process, two application submissions were deemed successful. Here 80% funding to cover capital costs has been awarded to two bus operators/ companies, a total of £561,612 awarded. Here

³ <https://gov.wales/environment-act-1995-activity-ensure-nitrogen-dioxide-compliance-air-quality-direction-2022-cardiff>

£191,920 has been awarded to Cardiff City Transport Services Ltd (Cardiff Bus) to retrofit 20 buses, and £369,692 has been awarded to Red and White Services Ltd, T/A Stagecoach South Wales to retrofit 29 vehicles.

Both operators completed the programme of works in Q4 of 2021, and has ensured that some of their older buses have improved their NOx emissions by some 90%.

EV Taxi Scheme

In Q3 of 2021 the Council procured 5 fully electric wheel chair accessible Dynamo Hackney Carriage Taxis. In partnership with a local vehicle hire company the Council launched an EV Taxi Lease Scheme with for licensed Cardiff drivers to take up an EV Taxi. This scheme was initially launched in January 2022. At the time of writing this report the Council is working further with our hire partner to further incentivise the scheme to improve take up of the scheme.

How to Get Involved

CC welcomes any correspondence relating to air quality enquiries or concerns. Shared Regulatory Services (SRS) Specialist Services Team represents CC for local air quality management and therefore is contactable using the following email address AirQuality-SRSWales@valeofglamorgan.gov.uk

For any enquiries surrounding Cardiff's Clean Air Plan, specifically the roll out of mitigation measures please contact Cardiff's Clean Air Team on cleanairproject@cardiff.gov.uk.

Hourly and Monthly average monitoring data for pollutants measured is available at <https://airquality.gov.wales/>

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1 Actions to Improve Air Quality

1.1 Previous Work in Relation to Air Quality

Phase 1

The Local Air Quality Management regime commenced with the Air Quality Regulations 1997, which came into force in December of that year. These Regulations were revoked and superseded by the current Air Quality (Wales) Regulations 2000 (as subsequently amended in 2002).

The first phase of the review and assessment process concluded that for six of the seven pollutants included in the regulations there was little, or no risk of the objectives being breached and that Air Quality Management Areas (AQMAs) for these pollutants were not necessary. Measures taken at the national level would be sufficient to ensure that there would be no local “hot-spots” of these pollutants and therefore local controls in addition to the national measures would not be required.

However, for the seventh of these pollutants, nitrogen dioxide (NO₂), it was concluded that national control measures such as vehicle emission and fuel standards, controls on industrial emissions, etc., would not, of themselves, be sufficient to ensure that the air quality objectives for this pollutant would not be met in all areas of Cardiff.

Whilst the vast majority of the area would meet the objectives, there were predicted to be local “hot-spots” close to heavily-trafficked road junctions where there were buildings close to the road and significant amounts of queuing traffic where the objectives would not be met.

As a result, four AQMAs were declared, each having been declared on the basis of measurements and modelling showing predicted breaches of the annual average objective for NO₂. These AQMAs were known as;

- The Cardiff West AQMA
- The Newport Road AQMA
- The Philog AQMA
- The St Mary Street AQMA

The first three of these came into force on 1st December 2000 and the latter on 1st September 2002. AQAPs the first three were published in November 2002 and for St Mary Street in February 2010.

Phase 2

The Council's 2003 USA concluded that for five of the seven pollutants regulated under the LAQM regime there was no evidence to suggest that local "hot-spots" for these pollutants had been missed in the first phase of the review and assessment process and that there was no need to consider these pollutants further at this time.

The 2003 USA also concluded that no local hot-spots of nitrogen dioxide had been overlooked during the first phase of review and assessment and that further detailed assessment of this pollutant was not necessary.

However, whilst the USA concluded that there was no evidence to suggest a likely breach of the 2004 objective for particulate matter (PM10), there was considerable doubt that the provisional 2010 objectives for PM10 would be achieved.

As a result of the conclusions of the 2003 USA the Council issued Progress Reports in 2004 and 2005.

Phase 3

Following the 2006 USA, the Council published and consulted upon an Air Quality Management Area (AQMA) Review during the autumn of 2006. This concluded that two of the four AQMAs could be revoked and that the then Cardiff West AQMA should be reduced in size and renamed as the Ely Bridge AQMA. Orders making the changes came into force on 1st February 2007.

The 2007 Progress Report highlighted a potential problem with regard to nitrogen dioxide concentrations on Newport Road in the immediate vicinity of Stephenson Court, where concentrations had been marginally, but consistently, above the Air Quality objective for a few years. It was concluded that the possibility of declaring a new AQMA would be assessed in the 2008 Progress Report.

The monitoring data for the Stevenson Court area presented in the 2008 Progress Report led to the conclusion that a further "watching brief" would be kept with a view to reaching a firm conclusion once ratified monitoring data for the 2008 calendar year became available.

The monitoring data for 2007 presented in the 2008 Progress Report provided reassurance that the Council's decisions in respect of the 2006 AQMA Review were soundly based.

Phase 4

The 2009 USA concluded that a Detailed Assessment for the Stephenson Court area of Newport Road was required as the annual mean concentration of nitrogen dioxide at three sites representative of relevant exposure in the area were above the air quality Objective.

A Detailed Assessment for this area was consulted upon during the summer of 2010 and the AQMA came into force on 1st December 2010.

The Council's 2010 Progress Report was submitted in December 2010 and the 2011 Progress Report in June 2011.

The 2011 Progress Report highlighted abnormally high NO₂ 2010 annual mean concentrations across the Council's monitoring network which could not be attributed to a particular source and evidence was presented to show that this was a regional issue probably associated with a prolonged period of unusually cold weather during November and December 2010. After dialogue with Welsh Assembly Government with regard to the conclusions reached about this data it was concluded that the Council would proceed to Detailed Assessments for the Llandaff and Westgate Street areas of the city and review the situation with regard to other exceedences when 2011 data is available and reported in 2012.

A Further Assessment for the Stephenson Court AQMA was submitted to WAG for review in December 2011, i.e. one year after the AQMA was declared, in compliance with Section 84(2)(a) of the Environment Act 1995.

Phase 5

The 2012 USA was the first report in Phase 5 of the review and assessment process. Monitoring data for 2011 largely confirmed that the annual mean concentrations of nitrogen dioxide previously reported for 2010 were unusually elevated, both locally and regionally, and local concentrations had returned to more typical values in 2011. Detailed Assessments in respect of nitrogen dioxide in Westgate Street and for the Llandaff area were consulted upon during the summer of 2012 and as a result a new AQMA for Llandaff was declared on 1st April 2013 and Westgate Street was incorporated into the St Mary Street AQMA; this latter AQMA is now named Cardiff City Centre AQMA.

The Council's 2013 Progress Report recommended proceeding to a Detailed Assessment for the Fair Oak Road Roundabout in the Plasnewydd Ward of the city as monitoring data over previous years indicated the need. This was submitted for review during 2014. The Assessment concluded that, as monitoring data for 2013 had returned to Objective compliance, there was no need to declare an AQMA at that time. It was proposed to continue monitoring in the area and review the results year-on-year.

The Further Assessment for the City Centre AQMA was submitted in April 2014 and the conclusion that the declaration of the AQMA was justified was accepted.

A Further Assessment for the Llandaff AQMA was also submitted for review in 2014. This concluded that the declaration of the AQMA was justified based upon monitoring data available at the time. However, as monitoring data for 2013 showed compliance with the Objective, it was concluded that there was no need to develop an Action Plan at that time. Monitoring would continue and the situation would be reviewed year-on-year.

In summary, there are currently four AQMAs in Cardiff; all have been declared in respect of NO₂ resulting from road-traffic emissions:

- Cardiff City Centre AQMA
- Ely Bridge AQMA
- Stephenson Court AQMA
- Llandaff AQMA

Phase 6

The 2015 USA was the first report in Phase 6 of the review and assessment process. Monitoring data for 2014 largely confirmed that the annual mean concentrations of nitrogen dioxide previously reported for 2010 were unusually elevated, both locally and regionally, and local concentrations had returned to more typical values in 2011.

Monitoring data for 2015 indicated that annual mean concentrations of nitrogen dioxide were not unduly elevated during the year and that in some locations concentrations may have been lower than expected. The 2016 Progress Report showed a number of sites representative of relevant exposure with exceedences of the 40µgm³ annual mean objective, however these sites and recorded exceedences were not out of character as were predominantly contained within the declared AQMAs.

2017 Annual Progress Report

There are a number of sites representative of relevant exposure with exceedences of the NO₂ annual mean objective (40µgm³). These sites are predominantly contained within the declared AQMAs. However, there are four monitoring locations (Site IDs 172, 180, 181, 185) which are not located within AQMAs.

Site 172 (Ocean Way) is a kerbside location situated up to 650m from any relevant exposure, used to examine potential impacts of traffic resulting from industrial development in the area.

Sites 180 & 181 were implemented due to new developments with the potential for adverse air quality impacting the amenity of future occupants (Windsor House, Windsor Lane & Fitzalan Court, Newport Road). Both developments were under construction in 2016, therefore influencing any datasets recorded. Only recently has the student accommodation at Windsor House been completed and construction still continues at the Fitzalan Court site.

Site 185 is not representative of relevant exposure and does not apply to the annual mean objective set for NO₂. Therefore, datasets collected at this monitoring location would apply to the 1-hour objective set for NO₂ (200µg/m³, not to be exceeded more than 18 times per year).

Monitoring for other pollutants did not result in other exceedences of National Air Quality Standards.

Due to technical issues, Cardiff City Centre's AURN site recorded low data capture for PM₁₀ measured by a TEOM- FDMS sampler. The total data capture for the year was 47.1%. As outlined in LAQM (TG16) the data from the sampler has been annualised in accordance with Box 7.9 and the 90.4th Percentile value has been given to examine the 24 hour objective.

It was decided not to revoke the Llandaff AQMA. Since the declaration of the Llandaff AQMA in 2013, results have highlighted that levels of NO₂ are generally improving and are now below the national objective of 40µg/m³ at locations of relevant exposure. Based on recent results the Council could be minded to revoke the AQMA. However, the 2017 APR highlighted that any decision made to revoke the AQMA needs to be mindful of the potential development of the strategic LDP sites to the north of the AQMA, Plasdwr and BBC Studios. Whilst detailed air quality assessments undertaken as part of the planning

process have modelled that there is unlikely to be a detrimental impact on air quality levels in the AQMA, this can only be fully verified through on going monitoring.

Therefore, in an effort to reassure local residents and to be totally satisfied that levels will remain compliant with the NO₂ standard, SRS on behalf of CC reviewed the non-automatic monitoring network of NO₂ diffusion tubes for 2018. As a result, new and amended monitoring sites have been allocated. Officers will further assess the potential to implement real-time capabilities in the Llandaff AQMA as part of the Council's statutory duties under Part IV of the Environment Act 1995. There are now four monitoring locations within the Llandaff AQMA.

Monitoring for other pollutants did not result in other exceedances of National Air Quality Standards.

2018 Annual Progress Report

Monitoring data for 2017 indicates that annual mean concentrations of nitrogen dioxide recorded at sites of relevant exposure, within the already established AQMAs, continue to be elevated or exceed the annual mean NO₂ Air Quality Standard (40µg/m³).

The datasets indicate that the annual average objective for NO₂ was breached at monitoring locations outside of the existing AQMAs (Sites 172, 179, 180 & 181).

It is felt that at this stage no further detailed assessments are required.

Site 172 is placed on Ocean Way to monitor potential impacts of traffic resulting from industrial developments in the area. The site is not representative of relevant exposure, the nearest being >650m away. For 2018 Site 172 has been revoked from the monitoring network as it is felt that a strong trend of data has been collected at this location.

The 1-hour objective for NO₂ need only apply to site 179.

Sites 180 & 181 were implemented to monitor air quality levels and therefore the potential impacts to future occupants at new development sites. These developments were still under construction in 2017 and therefore datasets collected will be negatively influenced.

The report also documented the works ongoing to produce the CASAP document, as well as outlining the development of the Feasibility Study in line with the Legal Direction received from the Welsh Minister.

2019 Annual Progress Report

Monitoring undertaken in 2018 confirmed annual average NO₂ levels continued to breach or encroach upon set limit values/ air quality standards within already established AQMAs (7 exceedances of the annual mean objective in total).

The report provided an update regarding the completion of the Clean Air Strategy and Action Plan document (CASAP), as well as an update of mitigation measures proposed to address air quality concerns for Cardiff. The report also documented the finalisation of the Full Business Case (FBC) and its outcome in accordance with Welsh Government's issued Legal Direction.

2020 Annual Progress Report

The 2020 reported identified that in 2019, out of the 100 diffusion tube monitoring locations, 6 monitoring sites recorded exceedances of the annual average objective set for NO₂ (40 µg/m³). All 6 monitoring locations were recorded within the already established City Centre and Llandaff air quality management areas (AQMA).

The report provided an update on the monitoring undertaken at 9 schools across Cardiff where previous studies from Client Earth identified the schools to be in close proximity to road links likely to cause exceedances of the NO₂ air quality standards. Monitoring undertaken at the 9 schools fully demonstrated continuous compliance with the annual average air quality standard for NO₂ for two success years. The report also provided an update of monitoring undertaken at a further 6 schools as part of a citizens science project funded by Natural Resources Wales. Again monitoring at these 6 schools demonstrated compliance with the objective for NO₂.

The report documented the approval from Welsh Government of the Final Clean Air Plan and awarding of funding to ensure the Council delivered compliance with the NO₂ limit value under the legal duties of the Ambient Air Quality Directive.

2021 Annual Progress Report

Monitoring data for 2020 indicated that annual mean concentrations of nitrogen dioxide recorded at sites of relevant exposure, within the already established AQMAs, all showed compliance with the annual mean NO₂ Air Quality Standard (40µg/m³). The results are indicative that the impacts of the COVID lockdowns and restrictions therein have had an impact on pollution levels in Cardiff which is likely owing to traffic volumes having decreased. It is therefore likely that the concentrations recorded in 2020 are not

representative of a true business as usual scenario and the results have generated a bias/underestimation of levels of pollution across Cardiff in 2020.

1.2 Air Quality Management Areas

Air Quality Management Areas (AQMA(s)) are declared when air quality is close to or above an acceptable level of pollution (known as the air quality objective (Please see Appendix A)). After declaring an AQMA the authority must prepare an Air Quality Action Plan (AQAP) within 18 months setting out measures it intends to put in place to improve air quality to at least the air quality objectives, if not even better. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

A summary of AQMA(s) declared by Cardiff Council can be found in Table 1. Further information related to declared or revoked AQMA(s), including maps of AQMA boundaries are available online at <https://uk-air.defra.gov.uk/aqma/list>.

Table 1 - Declared Air Quality Management Areas (AQMAs)

AQMA	Relevant Air Quality Objective(s)	Comments on Air Quality Trend	Description	Action Plan
Cardiff City Centre	NO ₂ annual mean	This year's monitoring results indicate an improvement in air quality compared to pre-covid data obtained in 2019.	Former St Mary Street AQMA with the addition of Westgate Street in Cardiff City Centre	Cabinet 13 June 2019 Clean Air Appendix 1 Clean Air FBC.pdf (moderngov.co.uk)
Llandaff	NO ₂ annual mean	This year's monitoring results indicate an improvement in air quality compared to pre-covid data obtained in 2019.	Centre on Cardiff Road through Llandaff village	
Stephenson Court	NO ₂ annual mean	This year's monitoring results indicate an improvement in air quality compared to pre-covid data obtained in 2019.	From NE and NW boundaries of Stephenson Court, NW boundary of Burgess Court, NW and SW boundaries of Four Elms Court, SW corner of Four Elms Court south across Newport road to the junction with Orbit street, West across Newport Road to the SE corner of Stephenson Court	
Ely Bridge	NO ₂ annual mean	This year's monitoring results indicate an improvement in air quality compared to pre-covid data obtained in 2019.	A number of residential premises along the A48 Cowbridge Road West,	

AQMA boundary maps within **Cardiff** are included in Appendix D.

1.3 Implementation of Action Plans

Each of the outlined AQMAs were declared as a result of road-traffic derived Nitrogen Dioxide (NO₂).

Section 84 of the Environment Act 1995 ensures that action must then be taken at a local level which is outlined in a specific Air Quality Action Plan (AQAP) to ensure that air quality in the identified area improves. After declaring an AQMA the authority must prepare a **DRAFT** Air Quality Action Plan (AQAP) within 18 months setting out measures it intends to put in place to improve air quality to at least the air quality objectives, if not even better. The AQAP must be **formally** adopted prior to 24 months has elapsed. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

In view of the statutory obligation to produce an AQAP for each AQMA, in 2019 SRS & CC developed a citywide Clean Air Strategy & Action Plan (CASAP) for Cardiff. The strategy is an evolving document and coincides with Cardiff's Capital Ambition report, helping to implement and deliver the priorities outlined in the Ambition report with an overarching aim to improve air quality to protect and improve public health in Cardiff. The CAS & Action Plan appoints strategic measures that will look to generate a positive impact to citywide air quality levels, in particular traffic derived NO₂ levels. Each measure has endured a cost benefit appraisal procedure by weighting the measures in terms of air quality impact, cost and timescale. The key theme of the strategic measures is to increase the uptake of sustainable modes of transport by influencing a behavioural change in Cardiff. The CASAP fulfils the requirements of the LAQM process to produce an Air Quality Action Plan (AQAP).

Table 2 - Progress on Measures to Improve Air Quality

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
Modal Shift & Influencing Travel Choice											
1.1	Increase Bus Use	Alternatives to private vehicle use	Proposals are in place for a park and ride system at Junction 33 which would look to intercept traffic on the A470, north Cardiff.	CC	No definite Start Date		Bus patronage figures produced via telematics	Unknown	The preparation of a draft Park and Ride Strategy for Cardiff has begun, and the Park and Ride at Junction 33 is being planned for delivery by the developer	Ongoing	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
1.2	Promotion of cycling and walking	Promoting Travel Alternatives	DRAFT Cycling Strategy sets out to double number of cycling trips by 2026; 9.2% modal share in 2015 to 18.4% in 2026. Five cycleways proposed. The INM prioritises cycling and walking routes over 15 year period.	CC	Ongoing		Cycle trips generated/ questionnaires	Unknown	Draft report and Cabinet Report seeking approval to undertake statutory consultation has been prepared and will be considered by Cabinet in JThe number of responses and technical work required means that it will not be possible to evaluate	Ongoing	

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		comments and make appropriate adjustments to draft Map and complete it in time to meet Welsh Government's (WG) 31st December 2021 deadline. WG officers to be informed that Cardiff unable to meet 31st December 2021 deadline and Council officers will seek									

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									extension of deadline in light of exceptional level of engagement on Cardiff's Active Travel Network Map		
1.3	School Travel Plans		CC has engaged with 'Living Streets' charity and have developed a 'WOW' (Walk Once a Week) scheme in 7 allocated	CC & Living Streets Charity	Ongoing		Report updates from Living Streets	Unknown	In 2021 this has increased to 43 schools	Ongoing	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
			schools in Cardiff.								
1.4	School Travel Plans		Cardiff Council's Schools Streets Project and its Traffic Regulation Order (TRO) pilot project.	CC	Ongoing		Monthly average NO ₂ levels examined at School property, Inside TRO and Outside TRO zone at residential facades. Questionnaires for school pupils and parents.	Unknown	15 schools assigned to the TRO Zone pilot project.	End of 2022 (Subject to funding, possibly longer)	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
1.5	Personalised Travel Planning	Promoting Travel Alternatives	Public Service Board Staff Charter.	Public Health Wales/ Vale and Cardiff Health Board	Working initially through Cardiff Public Services Board, a Healthy Travel Charter for Cardiff has been developed with major public sector employers and was launched in April 2019.		Modal shift counts. Number of participating public sector organisations.	Unknown	The Charter was signed by 11 public sector organisations at launch in April 2019, employing over 33,000 staff, with additional public and private sector organisations subsequently invited to sign up to the Charter.		
1.6	Increase awareness of air quality concerns	Public Information	Cardiff 'car-free' day	CC	Completed 2019		Air Quality Measurements .	No target	When comparing Sunday 19th May to Car-Free Day event 12th May, the daily average reduction for NO2 is as follows; Duke Street/ Castle Street- 16.11% Stephenson Court on Newport Road- 28.15%		Try to geographically expand and hold car-free days more regularly in Cardiff.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									Westgate Street- 13.62% Lower Cathedral Road- +9.14%		
1.7			Tredegarville CIW Primary School "Green Wall" project.	CC	Complete	August 2019	Air quality levels recorded at the school via non-automated principle diffusion tubes.	No target	Successful application under the Landfill Communities Fund to cover the supply and installation of outdoor green walls at Tredegarville CIW Primary School. Successfully installed August 2019. Additional Schools have been included in further Living Wall Projects in 2022.		Investigate monthly average diffusion tube results following implementation.
1.8			Dusty Forge/ Kitchener Primary School	CC	Ongoing	November 2020	Air quality levels recorded via non-automated	No Target	Welsh Government's 'Local Places for Nature' scheme. In summary it is proposed to install green walls		Investigate monthly average diffusion tube

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
							principle diffusion tubes.		at 2 Council owned buildings in areas of poor air quality and develop a citizen science project with the local community to monitor changes in air quality and biodiversity.		results following implementation
Infrastructure											
2.1	Bus Route Improvement	Transport Planning and Infrastructure	City Centre Improvement Schemes (3 elements East side/ City Centre North/ City Centre West)	CC & WG	2018	2019 (City Centre West Initiated) 2020 (city centre north and east initiated)	FBC	To ensure development does not cause any adverse impact and where possible reduce levels to as low as reasonably practicable.	City Centre West (central Sq Scheme) continued construction throughout 2021, with view of completion by 2023 for opening of Bus	2024	

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		Interchange in 2023. Castle Street remained closed through most of 2021, with interim scheme installed and opened from November 2021. City Centre East scheme commenced site preparation works in November 2021, with main works	Package of City Centre Schemes deemed to improve air quality levels for Castle Street. Revised modelling shows levels of 28 µg/m ³ will be achieved.								

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		commencing early 2022.									
	Completed and continues to be expanded and enhanced.	50 docking stations installed providing 500 bicycles for public use. Extra 500 bicycles assigned to Cardiff for the end of Summer 2019. Completion of the rollout of the Ebike	Unknown	Daily reports on usage provided to CC. 150,000 rentals reported since March 2018.	Ongoing		CC	Ovo Bike Hire Scheme		Public Cycle hire Scheme	2.2

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		fleet by September 2021, delivering a new fleet of 125 bikes in up to 15 rental stations. Completion was delayed into Q1/2 of 2022									
	Ongoing	Cycleway 1 St Andrew's Crescent to Senghennydd	3.5% modal shift which aligns with the assumptions	Cycling trip counts.	Ongoing		CC & WG	Proposed Cycleways		Cycle Network	2.3

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		<p>Road (works are complete for phase 1 of cycleway 1.Phase 2 will be constructed in 21/22</p> <p>Phase 1 between Cowbridge Road and Western Avenue via Sophia Gardens and Pontcanna Fields has been fully delivered and the Council</p>	<p>derived in the feasibility study.</p>								

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		has completed a detailed consultation on the options for Phase 2 which will connect Western Avenue with Llandaff village. Pop Up Cycleways •Cross City Scheme complete and ready for junction switch on when traffic									

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		<p>conditions allow</p> <ul style="list-style-type: none"> •Bay Pop Up complete, now requires new street lighting to be compliant with safety regulations. •Scheme to open officially once the lighting work is complete <p>Hailey Park</p> <ul style="list-style-type: none"> •Scheme awaiting tender 									

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		<p>following consultation outcome</p> <p>Cycleway 5</p> <ul style="list-style-type: none"> •Scheme out to consultation •Scheduled to be on site Q1/2 2022-23 <p>Cycleway 1</p> <ul style="list-style-type: none"> •Scheme entered on site September 2021 									

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									<ul style="list-style-type: none"> •Work progressing well •Controlled Parking Scheme to follow early 2022 		
2.4	Public transport improvements- interchanges stations and services		New Cardiff Central Interchange development	CC	Ongoing		Detailed AQAs quantifying the level of impact to air quality levels.	To ensure development does not cause any adverse impact and where possible reduce levels to as low as reasonably practicable	Construction of the Interchange has continued throughout 2021, and remains on course to be completed in 2023.	\$106 funding acquired for the amount of £10,000 to enhance air quality	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
										monitoring capabilities.	
2.4	Public transport improvements- interchanges stations and services 20 mph zones		Cardiff Capital Region Metro -Proposed by WG (Rail and bus based rapid transit routes).	CC	Ongoing			Unknown-supporting AQA will be a likely during the design and application stages	Good progress has been made to identify measures to encourage the use of sustainable travel as the economy recovers in partnership with the Welsh Government, the Burns Delivery Unit, Transport for Wales, City Region, public transport operators and key stakeholders. These measures include corridor improvements for Active Travel, bus priority, ongoing financial support for the bus services, integrated ticketing pilot between Cardiff and Newport in 2022, plans for	Ongoing	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									new transport interchanges (Cardiff Central, Waungron and Cardiff Parkway) and study work on new Metro station and line improvements.		
2.5			Implement further speed restrictions and enhance those already established "20mph Zones"	CC & WG	Ongoing		Safety figures & Monthly Average Diffusion tube results.	Unknown	CC has introduced 'signs only' 20mph limits in Cathays and Plasnewydd area. Approach coincides with the Safe Routes to School Programme.	Ongoing	

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		Plans are in place to hopefully expand 20mph limit areas in Grangetown. This is complete.									
	2022	Cardiff North Area has been included as a Pilot Area for WG assessment into 20 mph where existing limits are 30 mph. This	Unknown	Realtime Monitoring	Implementation		CC		Traffic Management	20 mph Zones	2.6

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		study will assist in National roll out of 20 mph as default urban speed limit.									
	2022	Cardiff North Area has been included as a Pilot Area for WG assessment into 20 mph where existing limits are 30 mph. This study will assist	Unknown	Realtime Monitoring	Implementation		Welsh Gov		Traffic Management	20 mph Zones	2.7

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
Lower Emission Vehicles											
3.1	Public Vehicle Procurement		Ultra-Low Emission Bus (ULEB) fund made available by the Department for Transport (DfT).		Ongoing	Three year rolling programme 2019-2021	Improvements to air quality levels (NO ₂) monitored by indicative methods by CC at sensitive receptor locations on specified routes	Approximately >2µg/m ³ reductions in NO ₂ sensitive receptor locations along Westgate Street	Application received by DfT and deemed successful. Initial buses delivered in November 2021 and all 36 launched in January 2022.		
3.2	Company Vehicle Procurement- Prioritising uptake of low emission	Promoting Low Emission Transport	Sustainable fuels strategy- assessment of Cardiff Council vehicle fleets	CC, DfT & Cardiff Bus	Ongoing	Economic savings and reduced Carbon footprint	Unknown	End of 2021 59 charge points across 7 Council sites fully implemented.	Ongoing		

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
			<p>6 Rapid chargers which will support charging for 12 refuse Vehicles.</p> <p>7 E RCV in service with.</p> <p>11 EVs on order for purchase or being delivered prior 31st March. 1 on pre-order, which will be in by the end</p>							vehicles/ EV recharging	

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
			of the year. The total will be 37 on fleet by the end of the year, which are all purchased, owned vehicles.								
	Ongoing	Progression of residential EV charging locations has ensured that 15 locations with a total of fast charging points have been installed across the City. Second	Unknown	EV vehicle counts/ EV point usage.	Ongoing		CC	Increase EV charging points for Cardiff residents/ workers.		EV recharging	3.3

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		<p>phase of 5 sites with 1 charge points was being progressed before being impacted by COVID – these are now planned for late August/early September.</p> <p>6 Rapid Charging stations have been installed with site operator Osprey</p>									

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		Charging at locations in the City Centre and Bay . Two additional schemes looking will increase to increase the number of publicly accessible charging stations in the city from 58 to around 75 before the end 2022.									

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
3.4	Taxi incentive to operate cleaner vehicles		Improve the emission standard profile of Cardiff's licensed Hackney and Private Hire Vehicles. Clean Air Funding allocated to provide EV grants for taxis.	CC	Ongoing		Uptake for the funding.	To ensure development does not cause any adverse impact and where possible reduce levels to as low as reasonably practicable	Due to COVID-19, the launch of the scheme was impacted and ongoing discussions with WG on use of allocated funding..		To achieve greatest air quality improvements zero emission or ULEV classified vehicles need to be incentivised.
3.5	Cardiff Clean Bus Retrofit Scheme 2020-21		Improve the emissions profile by improving the	CC & WG	COMPLETED 2021/22		Number of bus vehicles converted;	FBC identifies that the retrofit alone would achieve compliance	Scheme went live on 1 st October 2020 and a total of 49 buses have been		

Comments Relating to Emission Reductions	Estimated Completion Date	Progress to Date/ Progress in Last 12 Months	Target Annual Emission Reduction in the AQMA	Indicator	Implementation Phase	Planning Phase	Lead Authority	Focus	Category	Measure	No.
		retrofitted as of September 2021.	on Castle Street 39.6 µg/m ³ with 150 vehicles retrofitted.					euro standard composition of bus fleets operated in Cardiff. Via a competitive tender application process, Cardiff Council will administer a retrofit scheme aimed at improving the emission output of bus vehicles			

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
			operated in Cardiff.								
Policy											
4.1	Citywide strategy to reduce emissions and improve air quality		Cardiff Clean Air Strategy and Action Plan (CASAP)		2018		Recorded Improvements to air quality levels (NO ₂) monitored by indicative methods by CC at sensitive receptor locations	Annual average NO ₂ levels to be recorded at <35µg/m ³ at residential façade locations with specified AQMAs.	Finalised and approved by Cabinet. Submitted to Welsh Government for review.	Ongoing	
4.2	Taxi Licensing Conditions	Policy Guidance and Development Control	Amendments made to Cardiff taxi licensing conditions to	CC	2019- 2020		Taxi fleet composition %.		Impacted owing to COVID impacts on Taxi trade	Ongoing and will need to be reviewed in 2023	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
			promote a cleaner fleet.						during 2020-21		
4.3	Transport White Paper	Promoting Low Emission Transport	The Transport White Paper was launched on 15 January 2020 and lays out an ambitious 10-year plan to tackle the climate emergency, reduce congestion and improve air quality.	CC	2020- 2030		Improved air quality levels/ journey time. Sustainable modes patronage.	To generate air quality levels as low as reasonably practicable.	Published document 2020.		

2 Air Quality Monitoring Data and Comparison with Air Quality Objectives

2.1 Summary of Monitoring Undertaken in 2021

2.1.1 Automatic Monitoring Sites

In 2021, Cardiff had four automatic air quality monitoring sites located at;

- Frederick Street in the City Centre;
- Richard's Terrace, just off Newport Road;
- Castle Street, Cardiff City Centre; and
- Lakeside Primary School.

Details for these sites can be found in Table 3 and <https://airquality.gov.wales/>.

A further seven indicative AQMesh monitors were also located at various locations across the city. AQMesh analysers continuously monitor for Nitric Oxide, Nitrogen Dioxide & Ozone, PM₁₀ & PM_{2.5}, and do so every 15 minutes (data uploaded every hour). The data from the monitor is sent to a cloud server where it is corrected for temperature, pressure, and relative humidity as well as cross gas interference. Details of these locations are described in table 2.1. It is important to note that the readings from indicative monitors give an indication of air quality only. Although useful for understanding air quality trends and patterns, they are not used for formal comparisons to Air Quality Objectives (AQO).

Further information on AQMesh can be found at <https://www.aqmesh.com/>. Technical issues were experienced at two AQMesh sites during 2021, Westgate Street and Llandaff AQMA. Insufficient data was captured at these sites to allow data to be accurately represented within this report.

Cardiff City Centre, Frederick Street (Urban Background)- AURN 1

The site was commissioned in May 1992 and monitors on a 24/7 basis measuring levels of NO₂, PM₁₀ & PM_{2.5}, SO₂, CO and O₃ feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

Richard's Terrace, Newport Road (Urban Traffic)- AURN 2

The site monitors on a 24/7 basis measuring levels of NO₂ & PM₁₀ at that location, feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

Castle Street, Cardiff City Centre (Roadside)- Site 3

The site was commissioned in October 2020 and monitors on a 24/7 basis measuring levels of NO₂, PM₁₀ & PM_{2.5} at that location forming part of the Welsh Automated Monitoring Network.

Both sites AURN 1 & 2 are subject to six-monthly QA/QC audits by AEA, DEFRA's appointed contractor, and calibration gases are all traceable to National Standards. Calibrations have been carried out fortnightly by the appointed contractor.

Cardiff Lakeside (Urban Background)

The site monitors on a 24/7 basis measuring levels of Polycyclic aromatic hydrocarbons (PAH) at that location, feeding data directly into Defra's PAH Digital (solid phase) Network. SRS serve as a local site operator to this site, however data interpretation is sanctioned by the consultants Ricardo Energy and Environment Ltd, whereby concentrations are compared to the national air quality objective for B[a]P in ambient air, based on an annual mean concentration of 0.25 ng/m³. Details can be found in the UK Air Quality Strategy (Defra, 2007). Therefore, the purpose of this site and results derived are not corresponded to any of the limit values outlined for the purposes of LAQM in Wales.

Summarised results for various pollutants for the outlined automatic monitoring stations can be found at <http://www.welshairquality.co.uk> & <https://uk-air.defra.gov.uk/interactive-map>

2.1.2 Non-Automating Monitoring Sites

SRS on behalf of Cardiff Council undertook non- automatic (passive) monitoring of NO₂ at 113 sites during 2021.

Table 3 presents the details of the sites.

Maps showing the location of the monitoring sites are provided in figures 7 - 15. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

Table 3 - Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Cardiff City Centre AURN	Urban Background	318416	176525	NO ₂	N	Chemiluminescence	Y (5m)	200m	N
				PM ₁₀ , PM _{2.5}		TEOM- FDMS	Y (5m)	200m	N
				SO ₂		UV Fluorescence	Y (5m)	200m	N
				CO		Infra-Red GFC	Y (5m)	200m	N
				O ₃		UV Absorption	Y (5m)	200m	N
Cardiff Newport Road AURN	Roadside/ Urban Traffic	320095	177520	NO ₂	N	Chemiluminescence	Y (12m)	4.5m	N
				PM ₁₀		Beta Attenuation Monitor with Gravimetric Equivalence	Y (12m)	4.5m	N

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Cardiff Lakeside PAH	Urban Background	318951	179924	PAH	N	Digitel DHA-80 sampler	N/A	N/A	N/A
Cardiff Castle Street	Roadside/ Urban Traffic	318055,	176459	NO ₂	N	Chemiluminescence	Y(2m)	2m	Y
				PM ₁₀ , PM _{2.5}	N	Beta Attenuation Monitor with Gravimetric Equivalence	Y(2m)	2m	Y
Westgate Street AQMesh	Roadside/ Urban Traffic	317957	176389	NO ₂	Y	Electrochemical Sensor	Y (2m)	0.5m	N
				PM ₁₀ , PM _{2.5}					
Lower Cathedral Road AQMesh	Roadside/ Urban Traffic	317540	176437	NO ₂	N	Electrochemical Sensor	Y (0.5m)	1.5m	Y
				PM ₁₀ , PM _{2.5}					
Tudor Street AQMesh	Roadside/ Urban Traffic	317871	175929	NO ₂	N	Electrochemical Sensor	Y (2m)	1.5m	N
				PM ₁₀ , PM _{2.5}					

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
North Road AQMesh	Roadside/ Urban Traffic	317516	177854	NO ₂	N	Electrochemical Sensor	Y (2m)	1.5m	N
				PM ₁₀ , PM _{2.5}					
Penarth Road AQMesh	Roadside/ Urban Traffic	317748	175292	NO ₂	N	Electrochemical Sensor	Y (2.5m)	1.5m	Y
				PM ₁₀ , PM _{2.5}					
Lansdowne Road AQMesh	Roadside/ Urban Traffic	315960	176345	NO ₂	N	Electrochemical Sensor	N (5m)	1.5m	N
				PM ₁₀ , PM _{2.5}					
Llandaff AQMA AQMesh	Roadside/ Urban Traffic	315198	178220	NO ₂	Y	Electrochemical Sensor	Y (0.5m)	1.5m	Y
				PM ₁₀ , PM _{2.5}					

Notes:

(1) 0m indicates that the sited monitor represents exposure and as such no distance calculation is required.

Figure 1 - Map of Automatic Monitoring Locations in Cardiff AQMA and Surrounding Areas

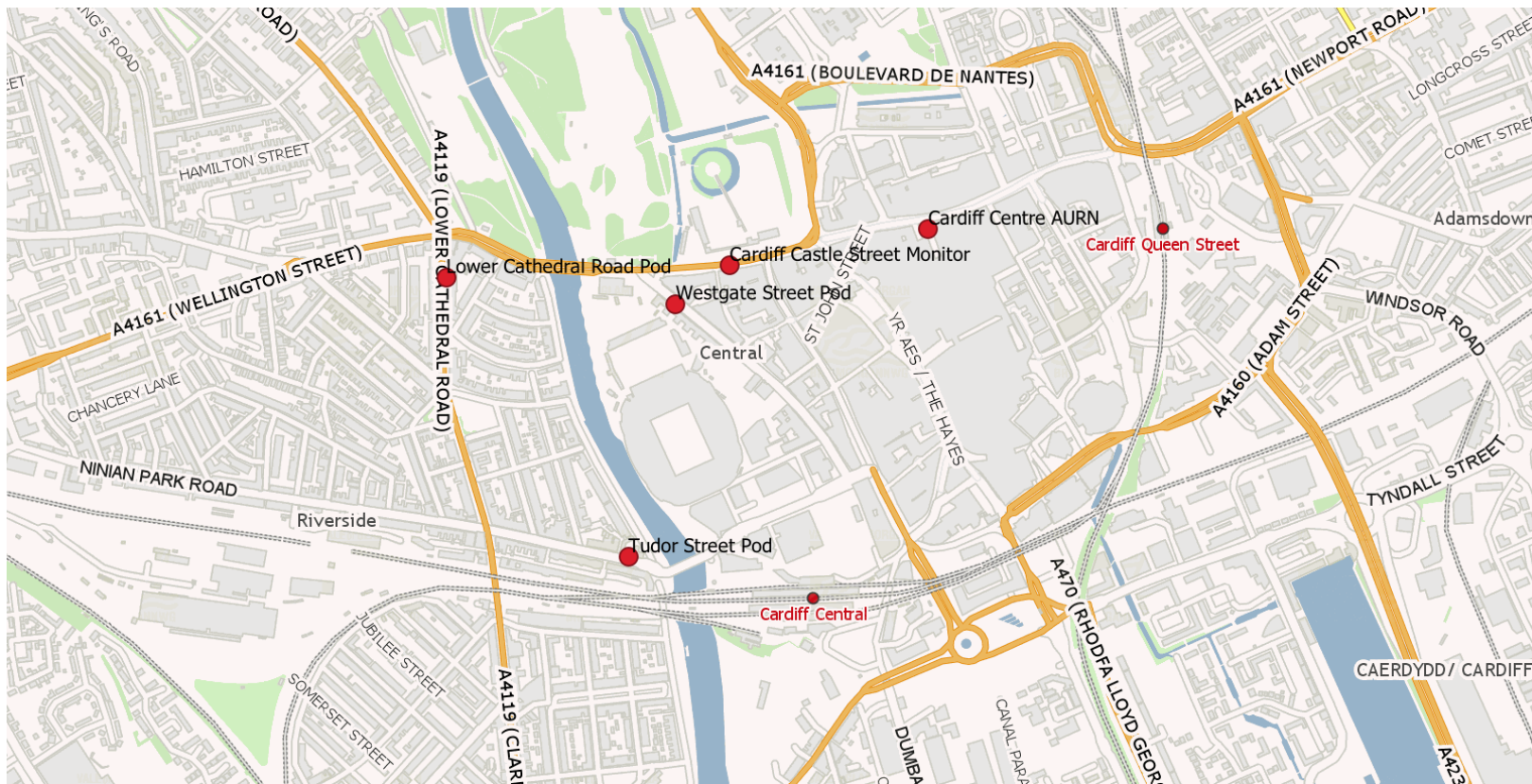


Figure 2 - Map of Automatic Monitoring Locations in Penarth Road and Tudor Street

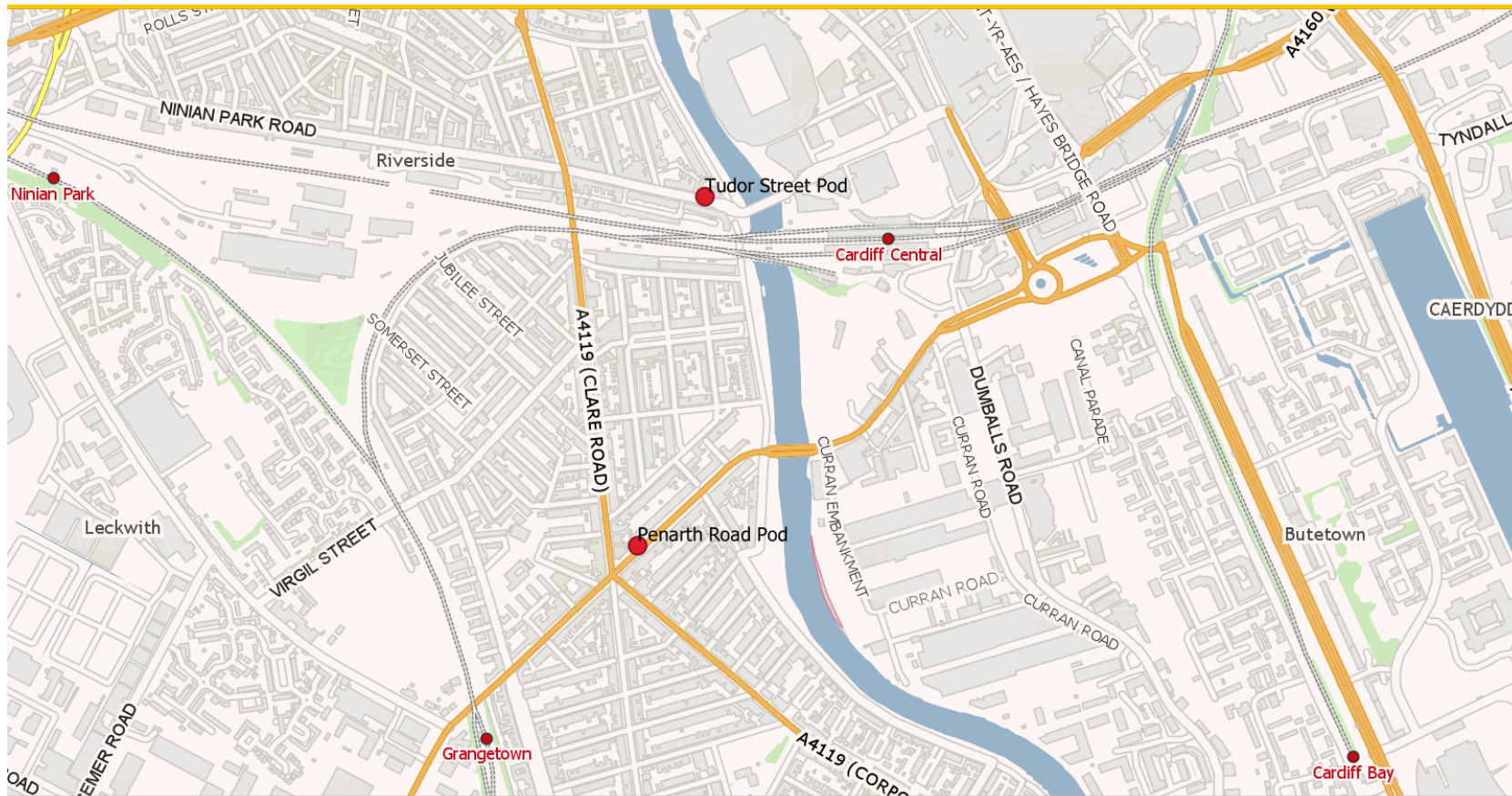


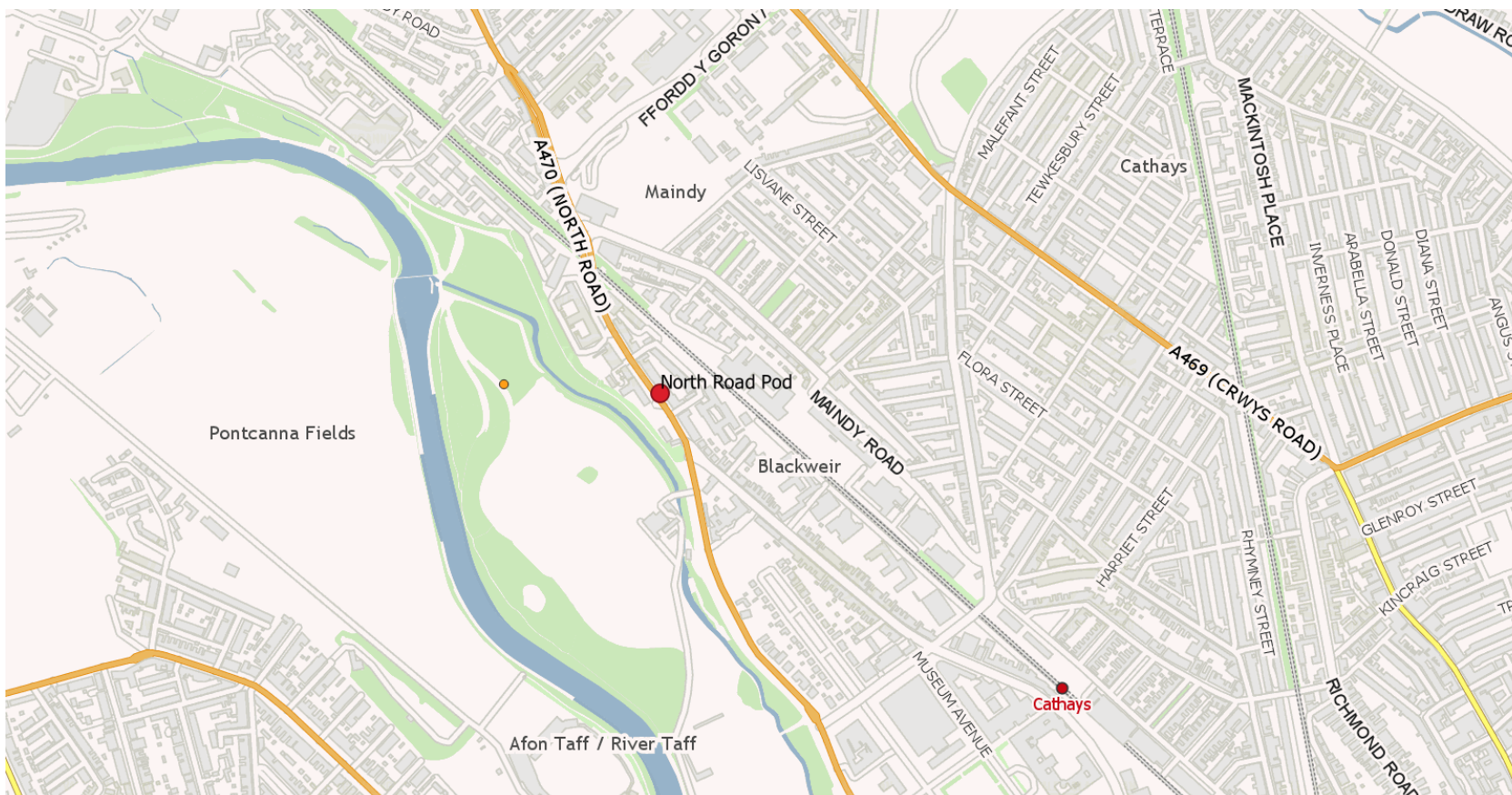
Figure 3 - Map of Automatic monitoring Location in North Road

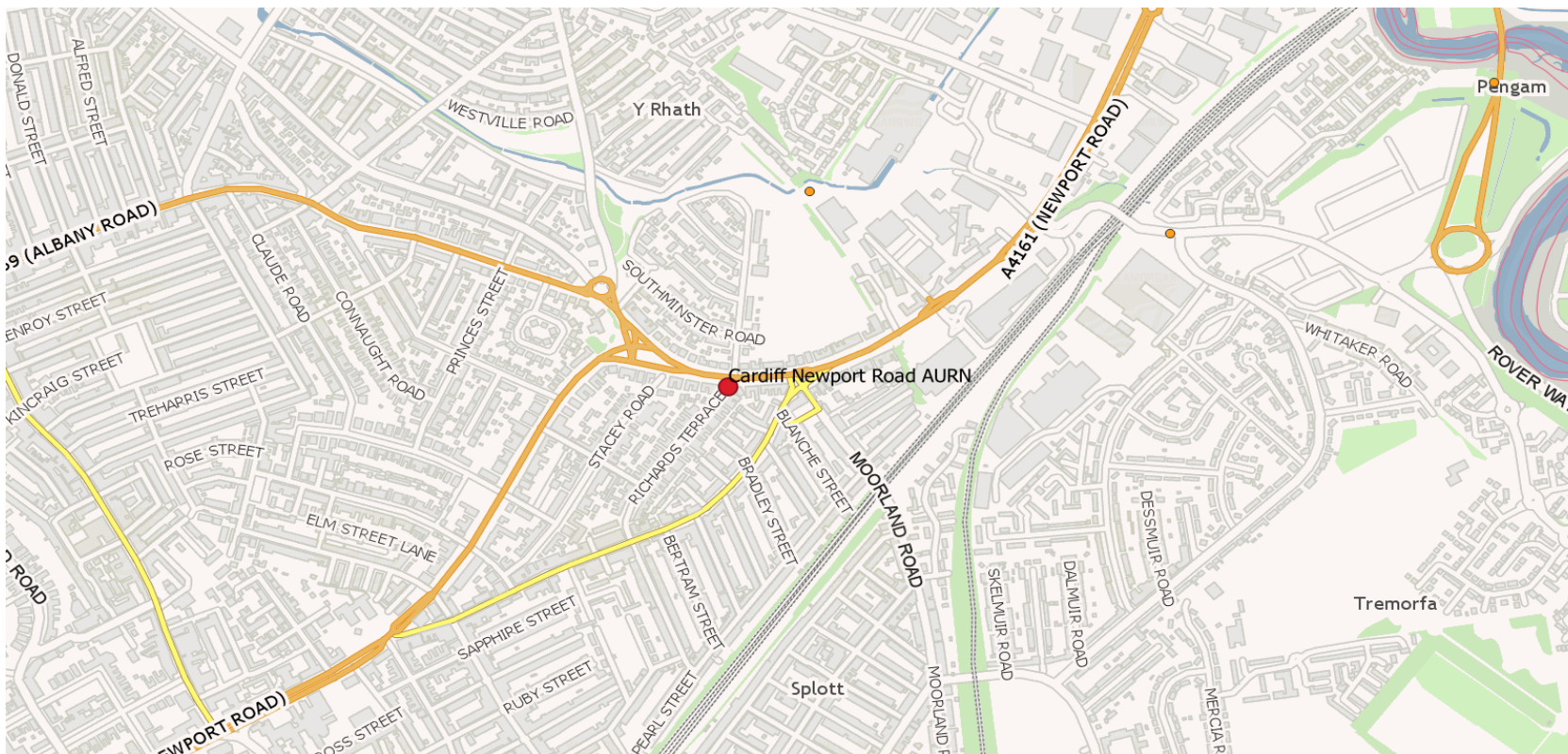
Figure 4 - Map of Automatic Monitoring Location in Newport Road

Figure 5 - Map of Automatic Monitoring Location in Llandaff AQMA

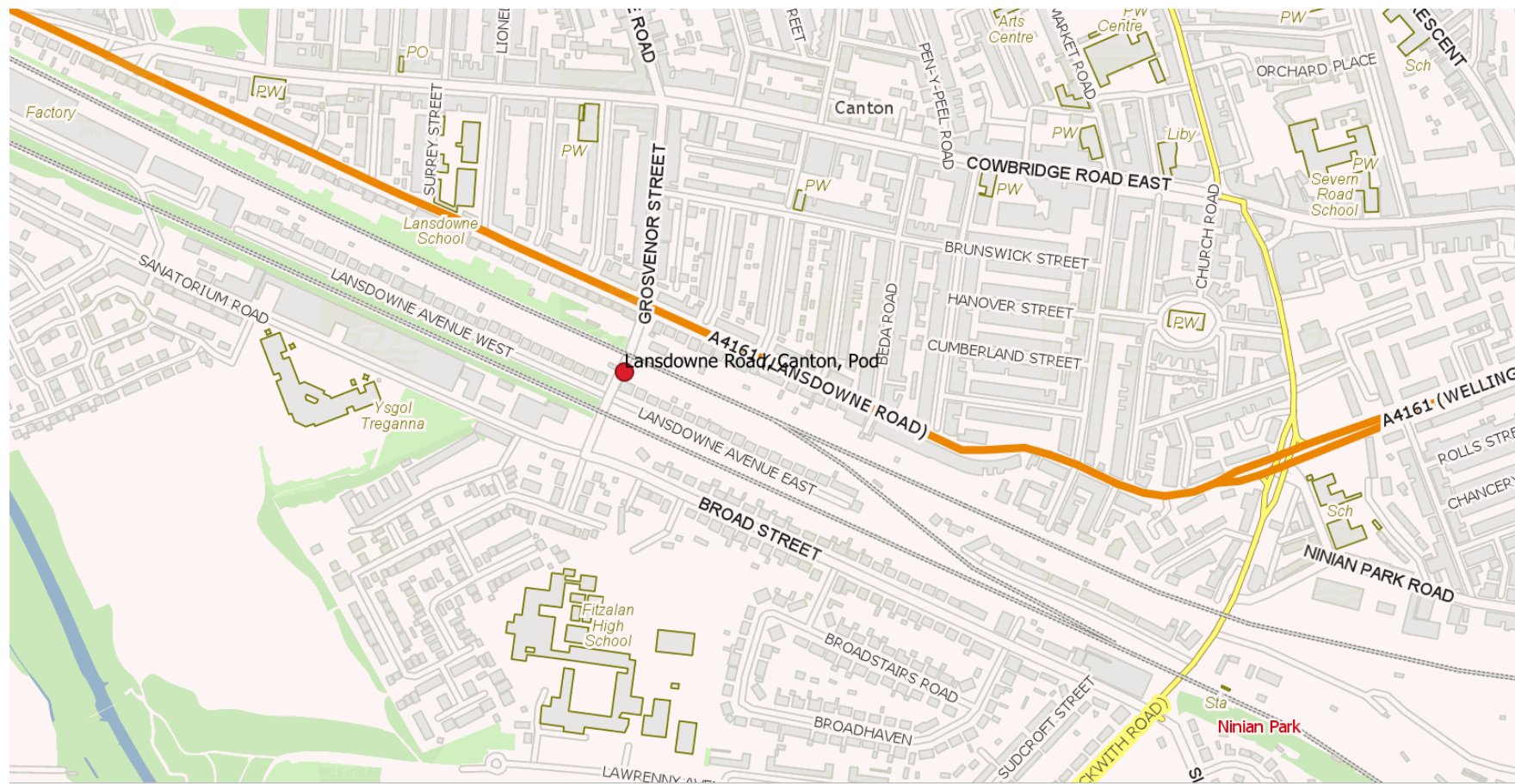
Figure 6 - Map of Automatic Monitoring Station near Lansdowne Road

Table 4 - Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
16	Ninian Park Road	Roadside	317040	176060	1.5	NO ₂	N	N	Y (0.05m)	5m	Y
58	Westgate Street	Kerbside	317937	176400	2.5	NO ₂	Y	N	N (5m)	0.5m	Y
81	Stephenson Court	Roadside	319387	176980	2	NO ₂	Y	N	Y (0.05m)	5m	Y
86	19 Fair Oak Road	Roadside	318452	178805	1.5	NO ₂	N	N	Y 0.10m)	10m	Y
96	Manor Way Junction	Roadside	316601	179653	1.5	NO ₂	N	N	Y (0.05m)	5m	Y
98	Western Avenue (premises)	Roadside	314805	177345	1.5	NO ₂	N	N	Y (0.05m)	10m	Y

99	Cardiff Road Llandaff	Roadside	315275	178117	1.5	NO ₂	Y	N	Y (0.05m)	3m	Y
101	Cardiff Centre AURN	Urban Centre	318416	176525	3	NO ₂	N	Y, Triplicate with Tubes 102 & 103	Y (0.10m)	200m	Y
102	Cardiff Centre AURN	Urban Centre	318416	176525	3	NO ₂	N	Y, Triplicate with Tubes 101 & 103	Y (0.10m)	200m	Y
103	Cardiff Centre AURN	Urban Centre	318416	176525	3	NO ₂	N	Y, Triplicate with Tubes 101 & 102	Y (0.10m)	200m	Y
106	30 Caerphilly Road	Roadside	316851	179520	1.5	NO ₂	N	N	Y (0.05m)	5m	Y
112	17 Sloper Road	Roadside	316613	175910	1.5	NO ₂	N	N	Y (0.05m)	5m	Y
115	21 Llandaff Road	Roadside	316604	176641	1.5	NO ₂	N	N	Y (0.05m)	3m	Y
117	25 Cowbridge Road West	Roadside	314458	176735	2	NO ₂	Y	N	Y (0.05m)	2m	Y
126	Westgate Street Flats	Roadside	317946	176387	1.5	NO ₂	Y	N	Y (0.10m)	5m	Y
128	117 Tudor Street	Roadside	317540	175979	1.5	NO ₂	N	N	Y (0.05m)	5m	Y
131	Dragon Court	Roadside	319292	176932	1.75	NO ₂	Y	N	Y (0.05m)	5m	Y

143	Windsor House	Roadside	318009	176337	1.5	NO ₂	Y	N	Y (0.10m)	6.5m	Y
144	Marlborough House	Roadside	318046	176307	1.5	NO ₂	Y	N	Y (0.10m)	6.5m	Y
147	211 Penarth Road	Roadside	317636	175161	1.5	NO ₂	N	N	Y (0.10m)	7.0m	Y
148	161 Clare Road	Roadside	317695	175389	1.5	NO ₂	N	N	Y (0.05)	5.0m	Y
149	10 Corporation Road	Roadside	317764	175174	1.5	NO ₂	N	N	Y (0.05)	4.6m	Y
156	2a/4 Colum Road	Roadside	317997	177412	1.5	NO ₂	N	N	Y (0.10m)	5.0m	Y
157	47 Birchgrove Road	Roadside	316605	179703	1.5	NO ₂	N	N	Y (0.10m)	8.0m	Y
158	64/66 Cathays Terrace	Roadside	318093	177716	1.5	NO ₂	N	N	Y (0.05m)	3.0m	Y
159	IMO façade replacement	Roadside	320709	177918	1.5	NO ₂	N	N	Y (0.10m)	4.0m	Y
166	163 Lansdowne Road	Roadside	315950	176424	1.5	NO ₂	N	N	Y (0.05m)	5.4m	Y
168	570 Cowbridge Road East	Roadside	314856	176929	1.5	NO ₂	N	N	Y (0.05m)	4.8m	Y

174	76 North Road	Kerbside	317508	177868	1.5	NO ₂	N	N	Y (0.1m)	1m	Y
179	Altolusso, Bute Terrace	Roadside	318627	176039	2	NO ₂	N	N	N (5.1m)	2.1m	N
183	Station Terrace	Kerbside	318765	176623	2	NO ₂	N	N	N (5.5m)	0.5m	Y
184	Hophouse, St Mary Street	Roadside	318335	176074	2	NO ₂	Y	N	Y (0.05m)	3.0m	Y
186	Dempsey's Public House, Castle Street	Roadside	318044	176449	2	NO ₂	Y	N	Y (0.05m)	2.90m	Y
187	Angel Hotel	Roadside	317944	176436	2	NO ₂	Y	N	Y (0.05m)	2.85m	Y
188	Westgate Street (45 Apartments)	Roadside	318229	176154	1.8	NO ₂	Y	N	Y (0.05m)	3.30m	Y
190	3 Pearson Street	Kerbside	319056	177343	2	NO ₂	N	N	Y (0.05m)	0.75m	Y
191	7 Mackintosh Place	Roadside	318724	177776	2	NO ₂	N	N	Y (0.05m)	3.0m	Y
192	3 Cowbridge Road West	Roadside	314505	176769	2	NO ₂	Y	N	Y (0.05m)	3.0m	Y
194	115 Cowbridge Road West	Roadside	313870	176212	2	NO ₂	N	N	Y (0.05m)	12.5m	Y

195	244 Newport Road	Roadside	320147	177523	2	NO ₂	N	N	Y (0.05m)	6.0m	Y
196	2 Pencisely Road	Roadside	316223	177305	2	NO ₂	N	N	Y (0.05m)	6.5m	Y
198	Next Building to Stephenson Court	Roadside	319348	176958	2	NO ₂	Y	N	Y (0.05m)	4.6m	Y
199	157 Newport Road	Roadside	319599	177174	2	NO ₂	N	N	Y (0.05m)	12.6m	Y
200	350 Whitchurch Road	Roadside	317038	179073	2	NO ₂	N	N	Y (0.05m)	3.5m	Y
201	23 Lower Cathedral Road	Roadside	317547	176411	2	NO ₂	N	N	Y (0.05m)	3m	Y
202	22 Clare Street	Roadside	317604	176053	2	NO ₂	N	N	Y (0.05m)	3.5m	Y
203	10 Fair oak Road	Roadside	318255	178533	2	NO ₂	N	N	Y (0.05m)	4.5m	Y
204	53 Neville Street	Roadside	317487	176303	2	NO ₂	N	N	Y (0.05m)	5m	Y
207	42 Waungron Road	Roadside	314769	177343	2	NO ₂	N	N	Y (0.05m)	6.8m	Y
208	2 Llantrisant Road, Llandaff	Roadside	315152	178245	2	NO ₂	Y	N	Y (0.05m)	3m	Y

209	178 North Road	Roadside	317200	178537	2	NO ₂	N	N	Y (0.05m)	3.5m	Y
210	485 Caerphilly Road	Roadside	316692	181088	2	NO ₂	N	N	Y (0.05m)	7.5m	Y
211	19 Well Wood Close, Penylan	Roadside	320247	178903	2	NO ₂	N	N	Y (0.05m)	28m	Y
212	62 Bridge Road	Kerbside	315197	178221	2	NO ₂	Y	N	Y (0.05m)	1m	Y
214	Mitre Place, Llandaff	Roadside	315254	178153	2	NO ₂	Y	N	Y (0.05m)	3.5m	Y
218	16-18 Cowbridge Road West	Roadside	314471	176770	2	NO ₂	Y	N	Y (0.05m)	4.2m	Y
220	Fitzalan Court Newport Road	Kerbside	318955	176689	2	NO ₂	N	N	N (6.5m)	1m	N
221	Stuttgarter Strasse (New student flats)	Kerbside	318530	176823	2	NO ₂	N	N	N (8m)	1m	N
224	110 Cardiff Road	Roadside	315714	177738	2	NO ₂	N	N	Y (0.05m)	4m	Y
243	25 Cardiff Road, Llandaff	Kerbside	315712	177740	1.75	NO ₂	Y	N	N (4m)	1m	N
244	25 Bridge Road, Llandaff	Roadside	314910	178789	1.75	NO ₂	N	N	Y (0.05m)	4m	Y

245	47 Willows Ave	Urban Background	321006	176584	1.75	NO ₂	N	N	N/A	N/A	N
247	Radyr Primary school	Roadside	312857	180734	1.5	NO ₂	N	N	N (4m)	1m	N
249	Wentloog Road, Rumney	Roadside	321709	179081	1.75	NO ₂	N	N	Y (0.05m)	3m	Y
250	Central Square Cardiff, City Centre	Roadside	318201	176022	1.75	NO ₂	N	N	N (4m)	2m	N
251	Heol Isaf, Radyr	Roadside	313244	180367	1.75	NO ₂	N	N	Y (0.05m)	5.2m	Y
254	Giraffe Nursery Cathedral Road	Roadside	317529	176340	1.5	NO ₂	N	N	Y (0.05m)	2m	Y
255	Castle Street Co-Location 1	Kerbside	318075	176462	1.5	NO ₂	N	Y	Y (0.05m)	1.5m	Y
256	Castle Street Co-Location 2	Kerbside	318075	176462	1.5	NO ₂	N	Y	Y (0.05m)	1.5m	Y
257	Castle Street Co-Location 3	Kerbside	318075	176462	1.5	NO ₂	N	Y	Y (0.05m)	1.5m	Y
258	Lampost outside 116 Penarth Road	Kerbside	317760	175310	1.5	NO ₂	N	Y	Y (0.05m)	7m	Y
Cardiff School Zone TRO Project											

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
TRO-001	Whitchurch High Lower School	Kerbside	315621	180320	1.5	NO ₂	N	N	N (4m)	5m	N
TRO-002	Glan-Y-Nant Terrace (inside)	Roadside	315589	180316	1.5	NO ₂	N	N	Y (0.05m)	2m	Y
TRO-003	Crossroads of Old Church Rd and Glan-Y-Nant terr (outside)	Kerbside	315548	180315	1.5	NO ₂	N	N	N (5m)	2m	N
TRO-004	Ysgol Melin Gruffydd School	Roadside	315620	180360	1.5	NO ₂	N	N	Y (0.05m)	2m	Y
TRO-005	34 Glan-Y-Nant Rd (inside)	Roadside	315608	180151	1.5	NO ₂	N	N	Y (0.05)	3m	Y
TRO-006	36 Old Church Rd (outside)	Roadside	315497	180140	1.5	NO ₂	N	N	Y (0.05m)	2m	Y
TRO-007	Peter Lea Primary	Roadside	313878	178319	1.5	NO ₂	N	N	Y (0.05m)	3m	Y
TRO-008	36 Carter Place	Roadside	313894	178331	1.5	NO ₂	N	N	Y (0.05m)	4m	Y

TRO-0099	3 Carter Place	Roadside	314022	178334	1.5	NO ₂	N	N	Y (0.05m)	5m	Y
TRO-010	Llandaff Church in Wales Primary	Kerbside	315274	177784	1.5	NO ₂	N	N	N (5m)	5m	N
TRO-011	20 Hendre Rd Llandaff	Kerbside	315279	177750	1.5	NO ₂	N	N	Y (0.05m)	1m	Y
TRO-012	48 Hendre Rd Llandaff	Roadside	315209	177668	1.5	NO ₂	N	N	Y (0.05m)	3m	Y
TRO-013	Pencaeru School	Kerbside	312803	175519	1.5	NO ₂	N	N	Y (0.05m)	3m	Y
TRO-014	16 Cyntwell Avenue	Roadside	312809	175496	1.5	NO ₂	N	N	Y (0.05m)	4m	Y
TRO-015	6A Cyntwell Avenue	Roadside	312734	175411	1.5	NO ₂	N	N	Y (0.05m)	3m	Y
TRO-016	29 Norfolk St	Roadside	315811	176555	1.5	NO ₂	N	N	Y (0.05m)	3m	Y
TRO-017	209 Lansdowne Rd	Roadside	315801	176492	1.5	NO ₂	N	N	Y (0.05m)	4m	Y
TRO-018	Lansdowne Primary School	Roadside	315801	176492	1.5	NO ₂	N	N	Y (0.05m)	4m	Y
TRO-019	St Cuthberts Primary School	Kerbside	319027	175493	1.5	NO ₂	N	N	Y (0.05m)	1m	Y

TRO-020	Letton Road	Kerbside	318910	175456	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-021	58 Letton Road	Kerbside	318945	175546	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-022	Tredegaville	Roadside	319268	176804	1.5	NO ₂	N	N	Y (0.05m)	4m	Y
TRO-023	Newport Road School Lane Zone	Kerbside	319228	176777	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-024	Glossops Road	Kerbside	319283	176827	1.5	NO ₂	N	N	N (5m)	1m	Y
TRO-025	St Peters Primary School	Roadside	319394	177096	1.5	NO ₂	N	N	Y (0.05m)	1m	Y
TRO-026	Southey Street	Kerbside	319339	177006	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-027	Wordsworth Avenue	Kerbside	319327	177080	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-028	St Monica's / Gladstone Primary School	Roadside	317982	178180	1.5	NO ₂	N	N	Y (0.05m)	3m	Y
TRO-029	Pentyrch Street	Kerbside	317987	178156	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-030	Cwmdare Street	Kerbside	317855	178921	1.5	NO ₂	N	N	N (2m)	1m	Y

TRO-031	Lakeside Primary School	Roadside	319031	179949	1.5	NO ₂	N	N	Y (0.05m)	1m	Y
TRO-032	Ontario Way	Kerbside	319012	180050	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-033	Woolaston Avenue	Kerbside	318898	180012	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-034	Bryn Hafod Primary School	Roadside	321817	180406	1.5	NO ₂	N	N	Y (0.05m)	1m	Y
TRO-035	8 Blagdon Close	Kerbside	321847	180402	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-036	Uphill Road	Kerbside	321834	180331	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-037	Glan Y Afon Primary School	Roadside	321705	181427	1.5	NO ₂	N	N	Y (0.05m)	1m	Y
TRO-038	Browning Close	Kerbside	321738	181398	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-039	Thackerey Crescent	Kerbside	321834	181282	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-040	Willow Brook Primary School	Kerbside	324489	180953	1.5	NO ₂	N	N	Y (0.05m)	1m	Y
TRO-041	Bullrush Close	Kerbside	324519	180949	1.5	NO ₂	N	N	N (2m)	1m	Y

TRO-042	Sandbrook Road	Kerbside	324529	180975	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-043	Creigau Primary School	Kerbside	307904	181561	1.5	NO ₂	N	N	Y (0.05m)	1m	Y
TRO-044	Tregarth Court	Kerbside	307896	181569	1.5	NO ₂	N	N	N (2m)	1m	Y
TRO-045	TY-Nant Road	Kerbside	307967	181585	1.5	NO ₂	N	N	N (2m)	1m	Y
Dusty Forge Community Centre Green Wall Project, Cowbridge Road West, Ely											
Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
GW-01	Dusty Forge Building Façade 1	Roadside	312870	175711	1.5	NO ₂	N	N	Y (0.05m)	10	Y
GW-02	Dusty Forge Building Façade 2	Roadside	312822	175719	1.5	NO ₂	N	N	Y (0.05m)	10	Y
GW-03	Dusty Forge Building Façade 3	Roadside	312860	175705	1.5	NO ₂	N	N	Y (0.05m)	10	Y
GW-04	Dusty Forge Kerbside 1	Kerbside	312896	175703	1.5	NO ₂	N	N	N (2m)	2	N

GW-05	Dusty Forge Kerbside 2	Kerbside	312877	175705	1.5	NO ₂	N	N	N (2m)	1	N
GW-06	Dusty Forge Kerbside 3	Kerbside	312884	175712	1.5	NO ₂	N	N	N (2m)	2	N
GW-07	Cowbridge Rd West 456	Kerbside	312899	175731	1.5	NO ₂	N	N	Y (0.05m)	10	Y
Kitchener Primary School, Kitchener Road											
Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
GW-08	Kitchener Primary School Façade 1	Roadside	316735	176210	1.5	NO ₂	N	N	Y (0.05m)	10	Y
GW-09	Kitchener Primary Façade 2	Roadside	316743	176196	1.5	NO ₂	N	N	Y (0.05m)	10	Y
GW-10	Kitchener Primary Façade 3	Roadside	316754	176166	1.5	NO ₂	N	N	Y (0.05m)	10	Y
GW-11	Kitchener Road Lamppost 1	Kerbside	316748	176176	1.5	NO ₂	N	N	N (2m)	2	N
GW-12	Kitchener Road Lamppost 2	Kerbside	316735	176211	1.5	NO ₂	N	N	N (2m)	1	N

Notes:

(1) 0m indicates that the sited monitor represents exposure and as such no distance calculation is required.

Figure 7 - Map of Non-Automatic Monitoring Locations in Cardiff City Centre AQMA and Surrounding Areas

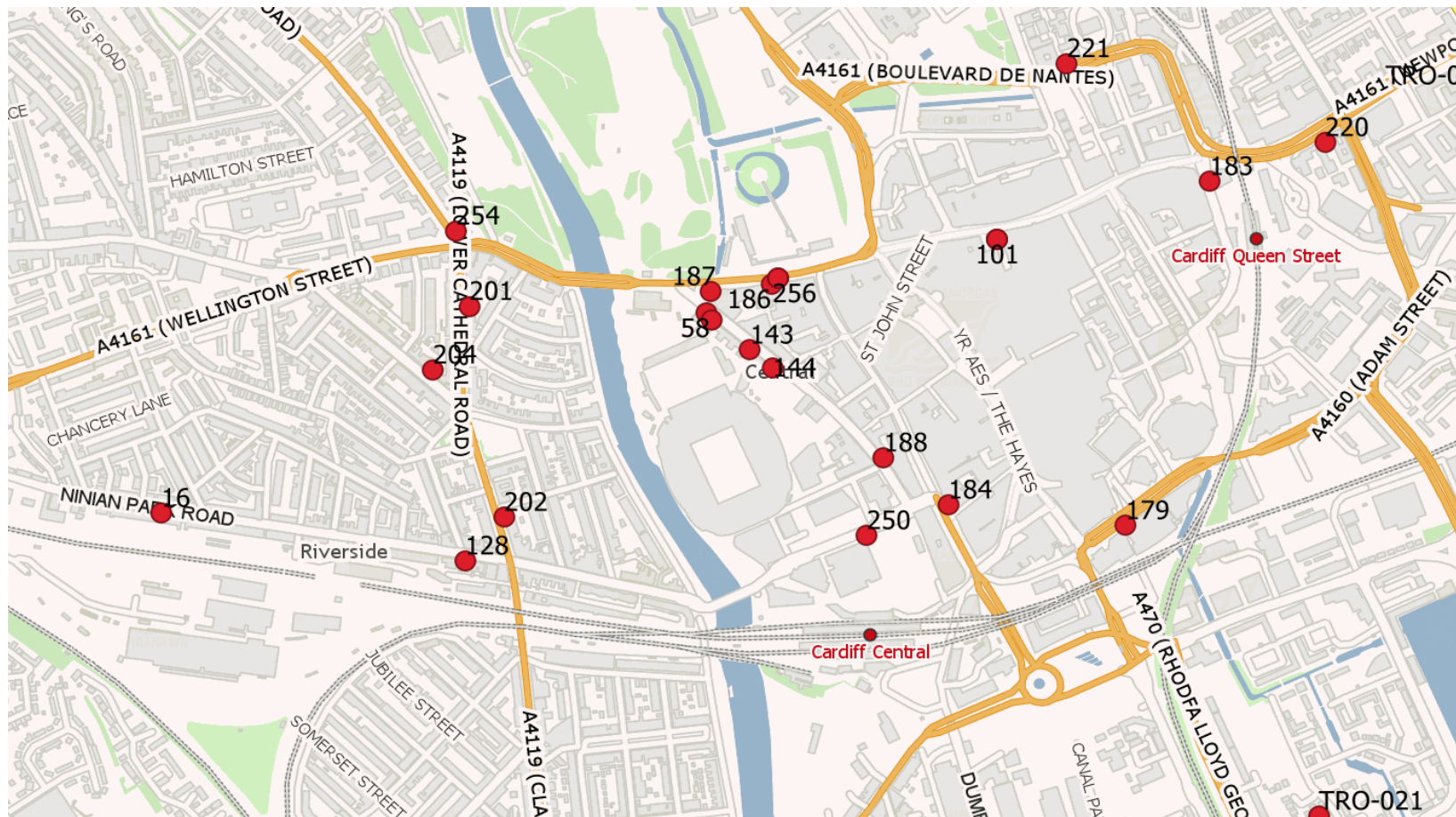


Figure 8 - Map of Non-Automatic Monitoring Locations in Stephenson Court AQMA and Surrounding Areas

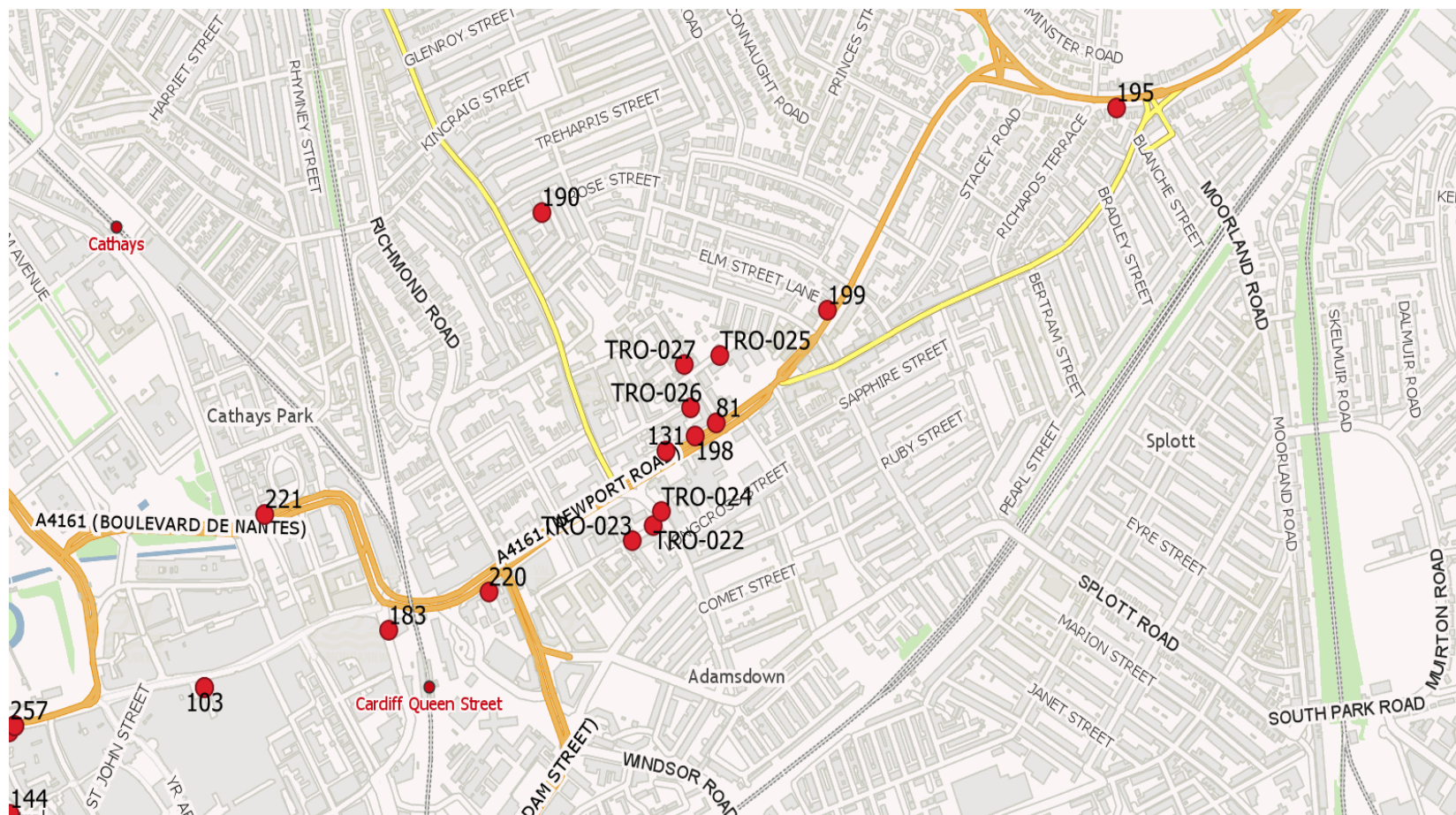


Figure 9 - Map of Non-Automatic Monitoring Locations in Llandaff AQMA and Surrounding Areas

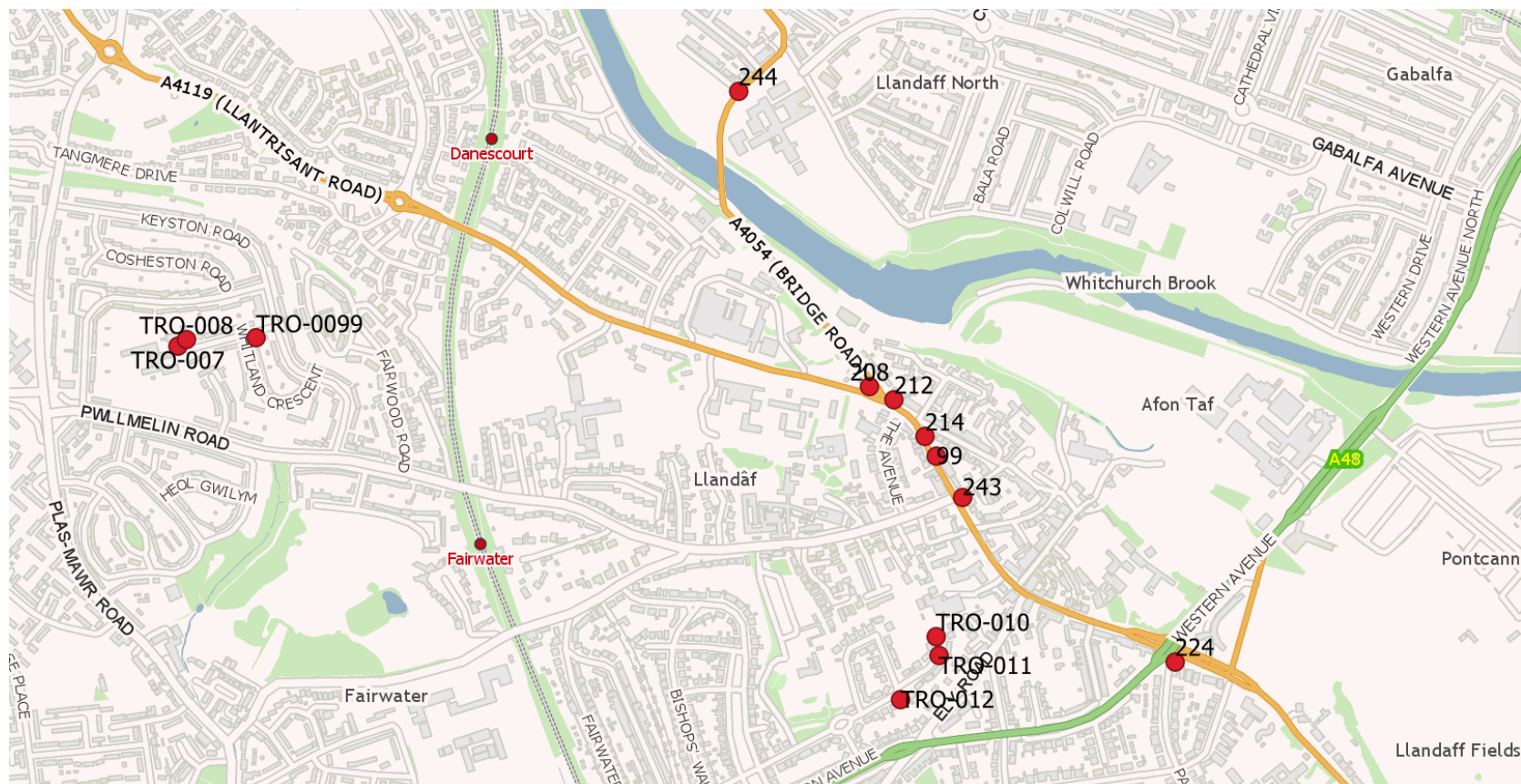


Figure 10 - Map of Non-Automatic Monitoring Locations In Ely Bridge AQMA and Surrounding Areas

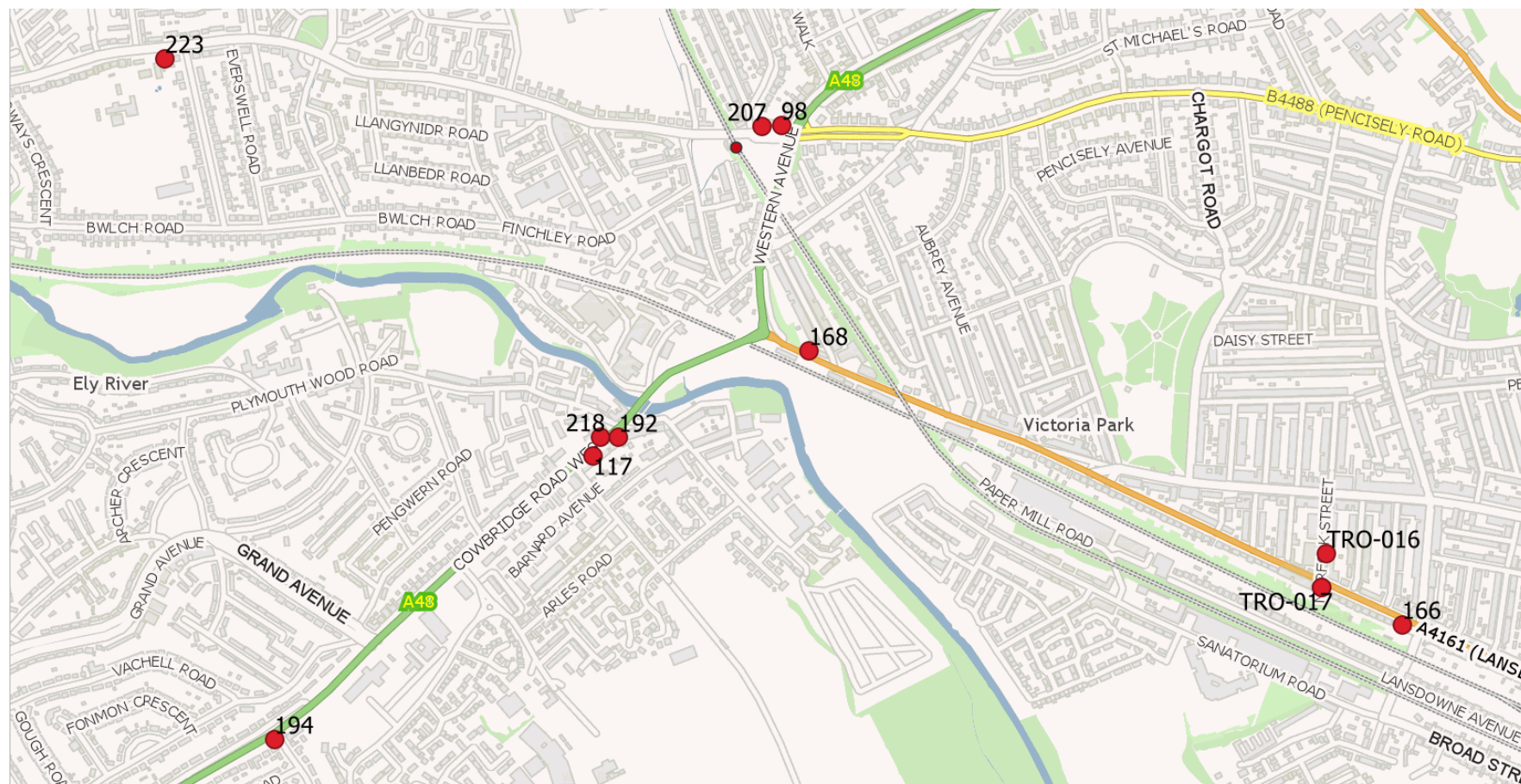


Figure 11 - Map of Non-Automatic Monitoring Locations in Cathays, Penylan and Surrounding Areas

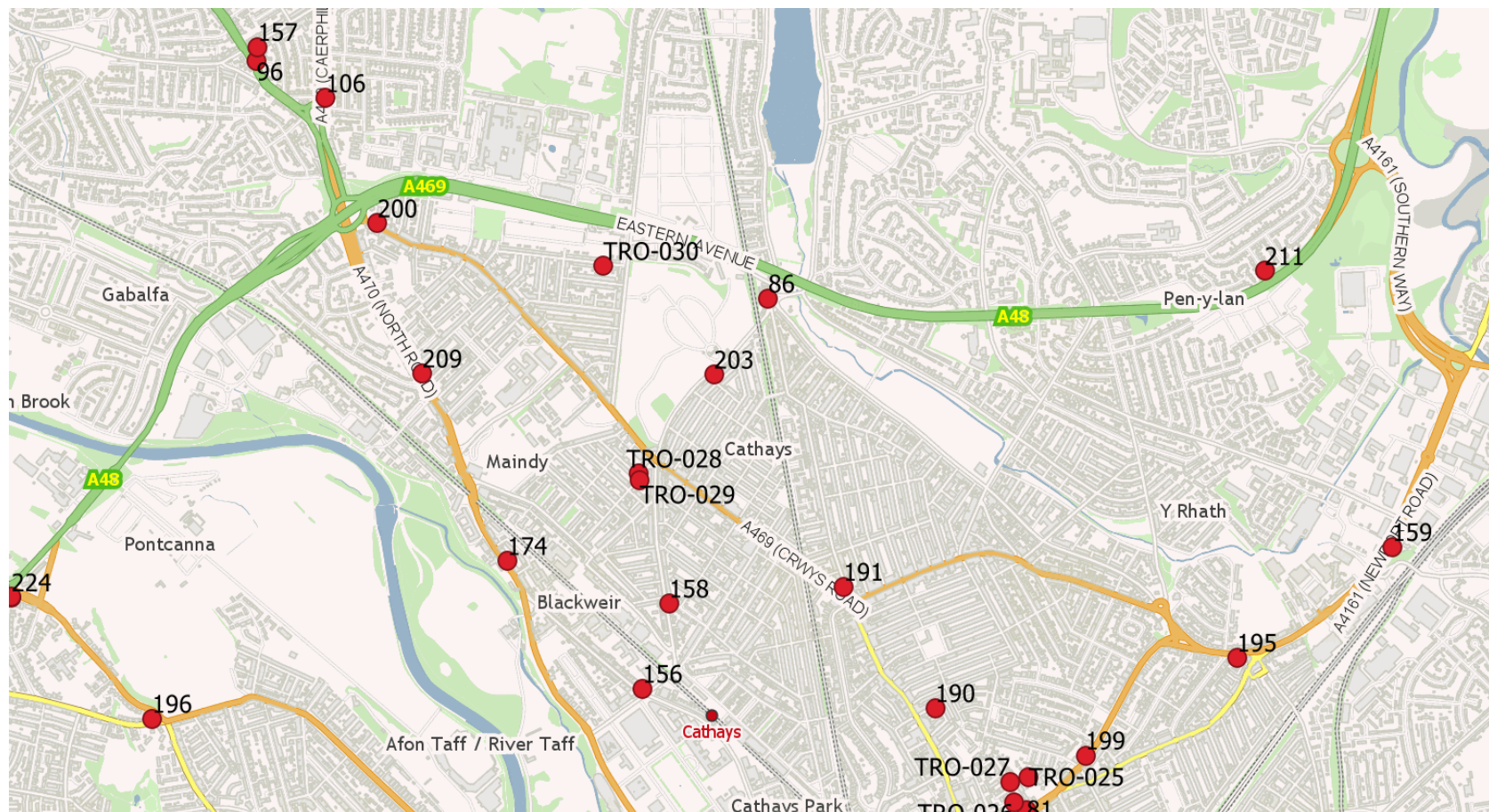


Figure 12 - Map of Monitoring Locations in Llanrumney, St Mellons and Surrounding Areas

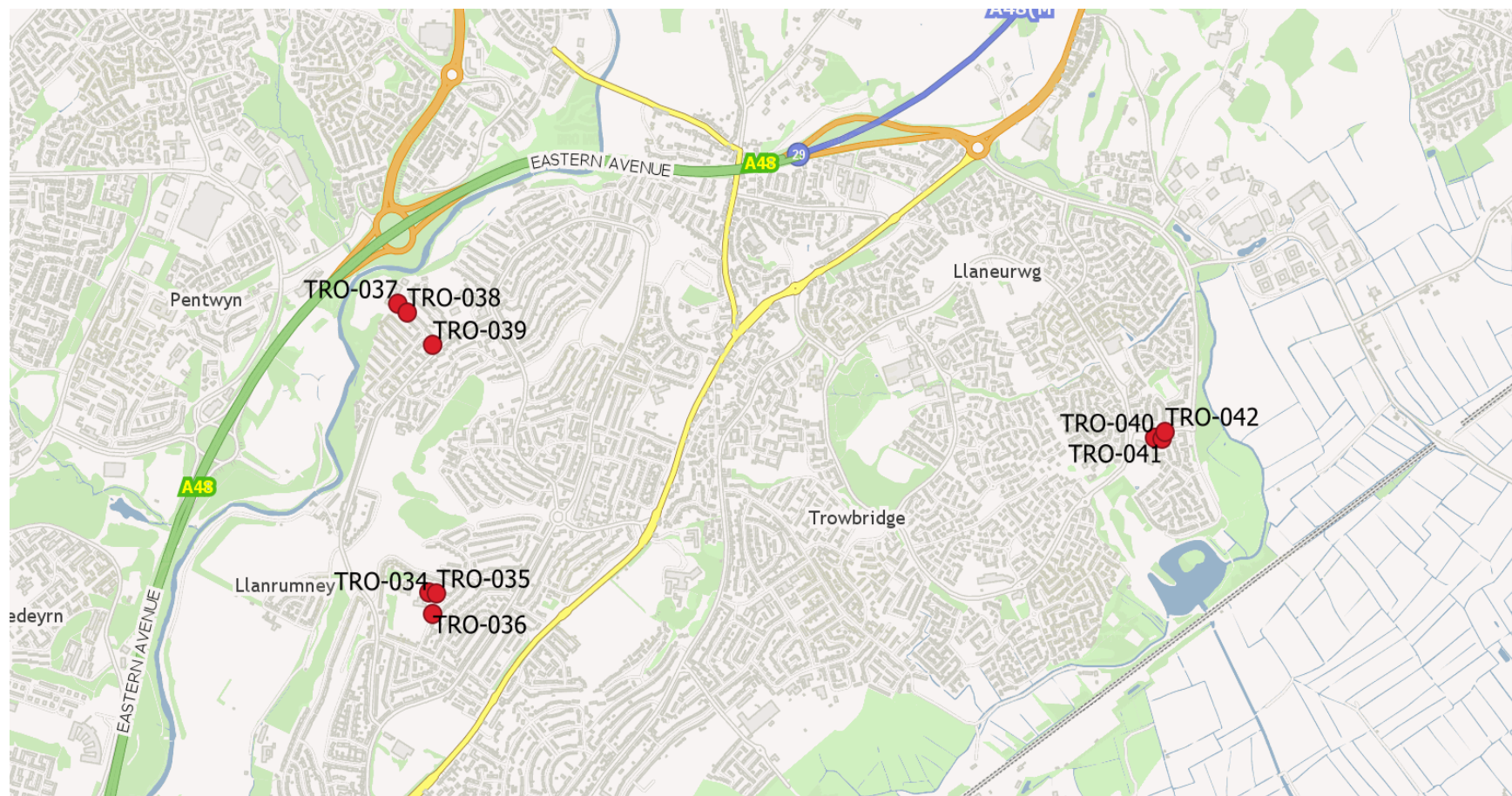


Figure 13 - Map of Non-Automatic Monitoring Locations in Riverside, Canton and Surrounding Areas

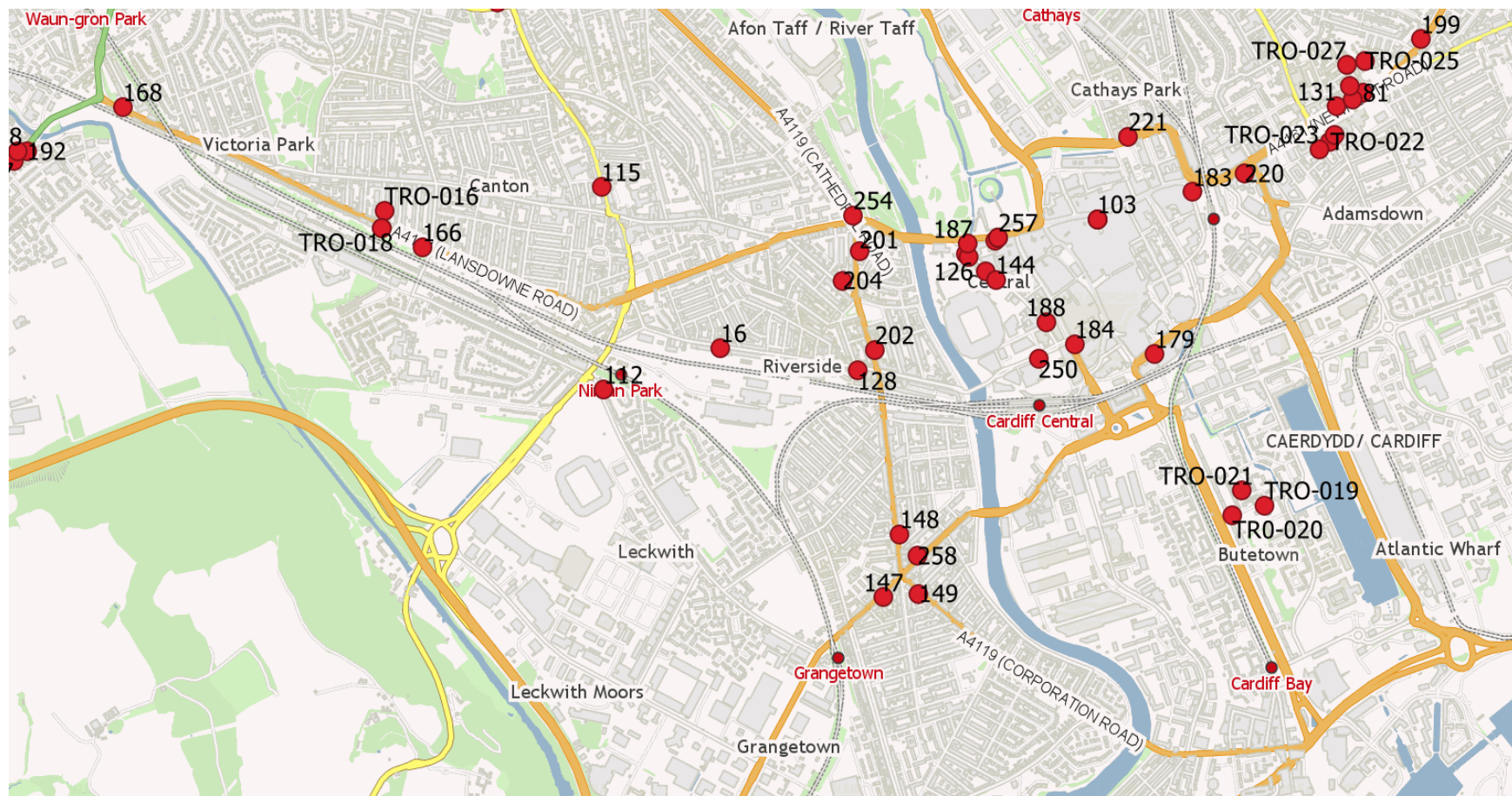


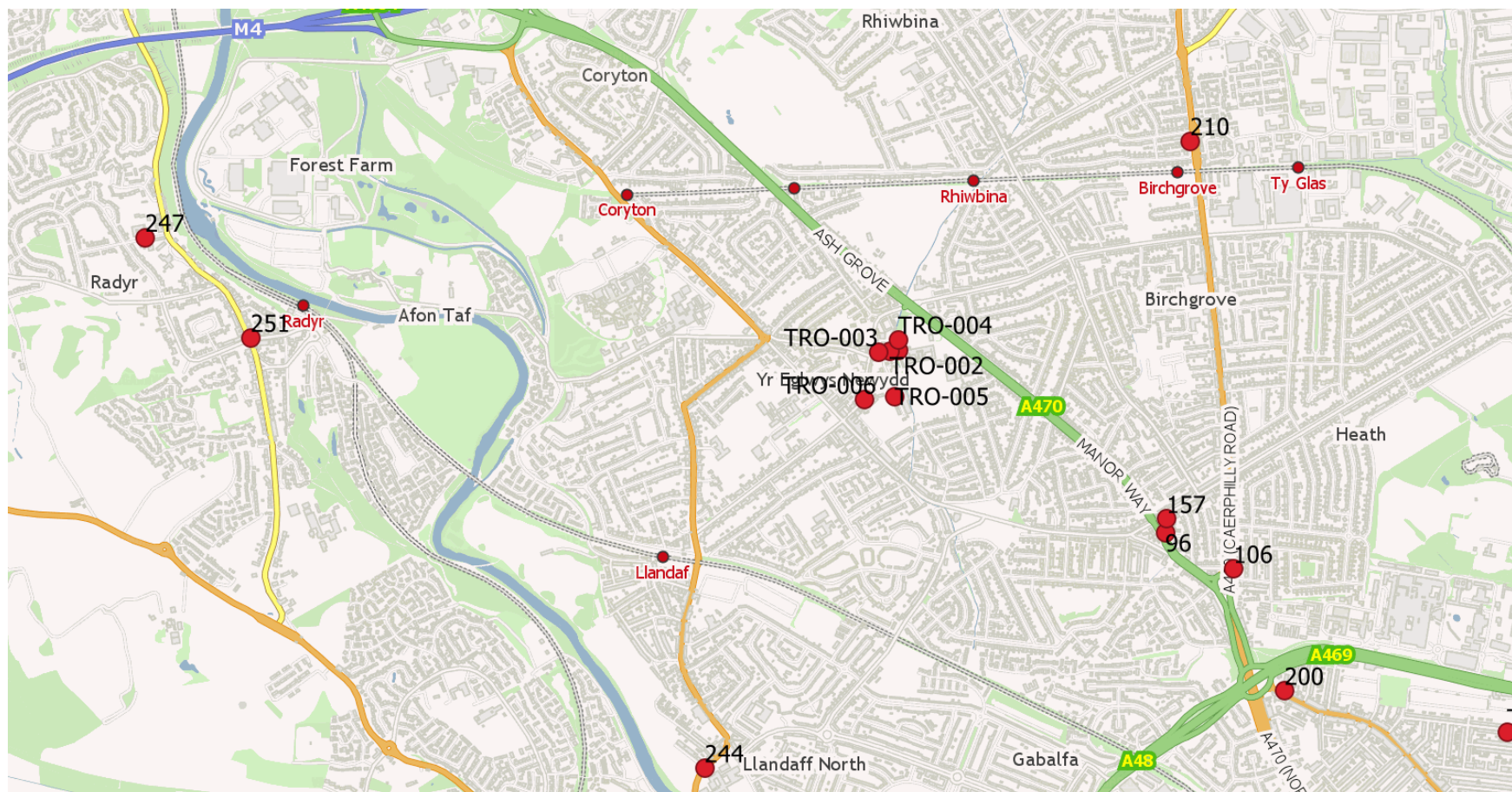
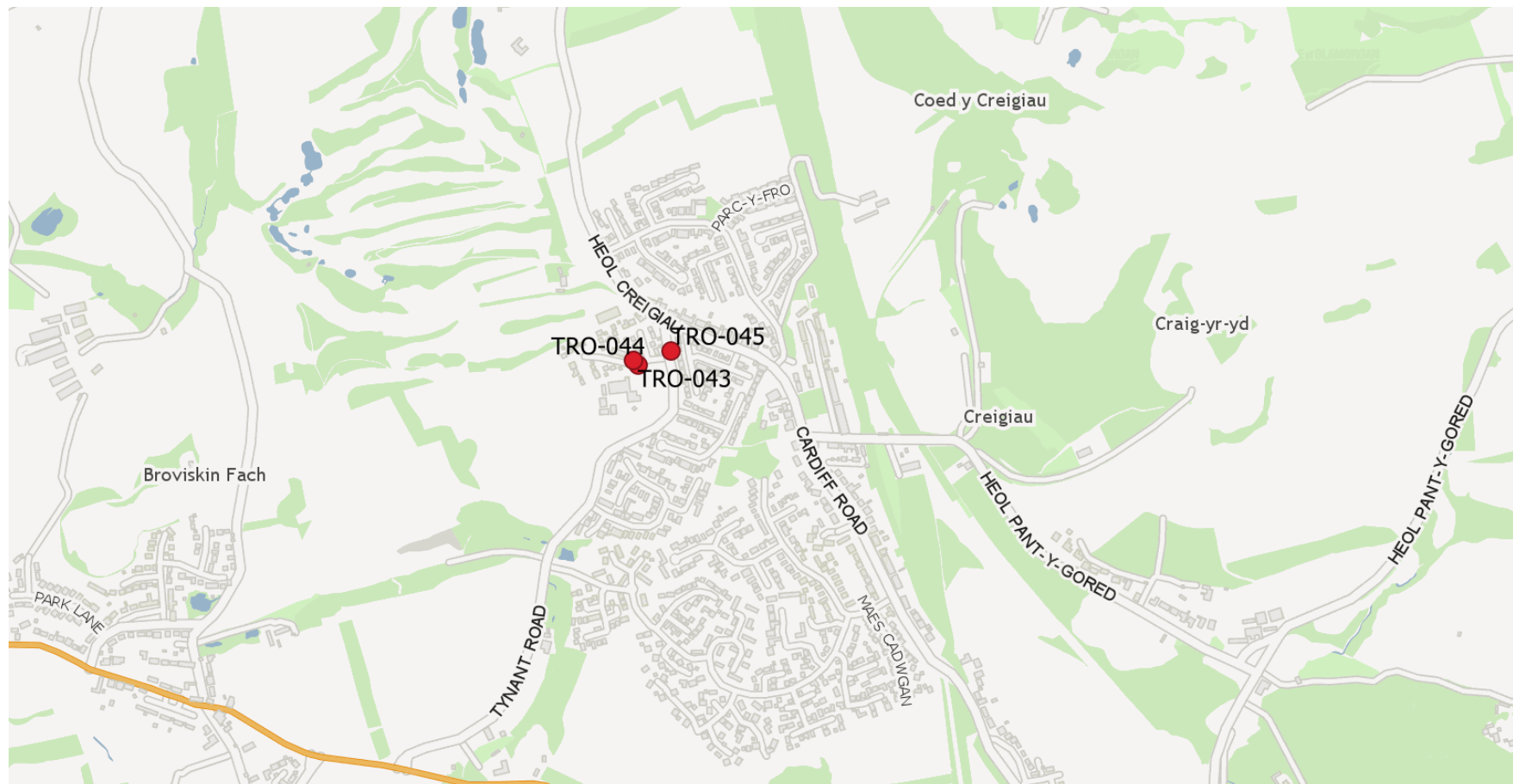
Figure 14 - Map of Non-Automatic Monitoring Locations in Cardiff North

Figure 15 - Map of Non-Automatic Monitoring Locations in Creigiau



2.2 2021 Air Quality Monitoring Results

Table 5 – Non-Automatic Annual Mean NO₂ Monitoring Results (µg/m³)

Site ID	Site Type	Monitoring Type	Valid Data Capture 2021 (%) ⁽¹⁾	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m ³ ⁽²⁾						
					2015	2016	2017	2018	2019	2020	2021
					(Bias Adjustment Factor = 0.79)	(Bias Adjustment Factor = 0.78)	(Bias Adjustment Factor = 0.77)	(Bias Adjustment Factor = 0.76)	(Bias Adjustment Factor = 0.75)	(Bias Adjustment Factor = 0.76)	(Bias Adjustment Factor = 0.78)
16	Roadside	Diffusion Tube	100	N	27.9	28.9	28.9	27.8	27.3	23.6	23.2
58	Kerbside	Diffusion Tube	100	Y	48.3	45.3	44.5 ²	45.8	41.2	30 ²	30.8
81	Roadside	Diffusion Tube	100	Y	35.3	37.6	35.9	34.9	34.4	27.2	29.3
86	Roadside	Diffusion Tube	100	N	34.9	35.6	37	33.4	31.7	25.8	27.0
96	Roadside	Diffusion Tube	92	N	31.1	36.9	31.8	31.4	29.4	22.2	24.2
98	Roadside	Diffusion Tube	100	N	25.4	28.4	26.2	26.1	24.6	20	20.8
99	Roadside	Diffusion Tube	100	Y	29.8	34.8	31	31.7	30.4	22.8	25.1
101	Urban Centre	Diffusion Tube	50	N	20.3	23.1	21.3	21.1	NR	14.3 ²	14.0
102	Urban Centre	Diffusion Tube	50	N	21.1	22.5	20.9	20.6	NR	14.7 ²	13.4
103	Urban Centre	Diffusion Tube	50	N	20.7	23.2	21.6	20.7	NR	15.1 ²	13.5
106	Roadside	Diffusion Tube	100	N	29.4	32.2	31.5	27.8	28.3	24.5	23.7

112	Roadside	Diffusion Tube	100	N	27.1	29.5	27.4	26.7	25.8	20.7	23.1
115	Roadside	Diffusion Tube	83	N	32.5	32.8	32.7	30	30.6	25.3	25.6
117	Roadside	Diffusion Tube	100	Y	39.5	41.3	38	40	36.8	30.7 ²	36
126	Roadside	Diffusion Tube	92	Y	36	38.4	39.4 ²	35.1	33.3	22.3	24
128	Roadside	Diffusion Tube	100	N	29.6	31.2	29.8	28.3	29.8	25	25
131	Roadside	Diffusion Tube	100	Y	39.5	39.6	41.7	38.2	35.7	28.8	26.7
143	Roadside	Diffusion Tube	100	Y	38.2	38.7	38.4 ²	37.3	35.6	23.5	25.7
144	Roadside	Diffusion Tube	75	Y	37.2	38.3	36.8 ²	34.3	33.9	25	26.4
147	Roadside	Diffusion Tube	100	N	27.7	28.8	26.2	29.3	26.9	20.5	23.8
148	Roadside	Diffusion Tube	100	N	27.5	29.2	27.3	26.6	25.6	21.3	23.9
149	Roadside	Diffusion Tube	100	N	33.6	31.2	32.5	31.3	30.1	26.8	25.9
156	Roadside	Diffusion Tube	92	N	25.9	29.7	25.7	26.8	24.8	17.4	20.1
157	Roadside	Diffusion Tube	100	N	27.2	28.2	28.3	25.1	23.6	19.3	19.4
158	Roadside	Diffusion Tube	100	N	25.5	29	26.1	26.2	24.2	17.6	21.0
159	Roadside	Diffusion Tube	100	N	34	35.5	38.6	35.6	32.2	26.4	27.4
166	Roadside	Diffusion Tube	100	N	32.1	33.2	32.1	30.6	31.4	26.3	26.7
168	Roadside	Diffusion Tube	100	N	24.3	27.7	26.2	26	24.7	21.1	22.7

174	Kerbside	Diffusion Tube	100	N	28.7	33.3	27.5	28.2	26.8	17.7	20.0
179	Roadside	Diffusion Tube	100	N	-	39.7 ²	45.4 ²	43. ²	33.1 ²	32.4	37.6
183	Kerbside	Diffusion Tube	100	N	-	35.9	31.2	31.1	30.9	23.5 ²	23.7
184	Roadside	Diffusion Tube	67	Y	-	41.4	38.7 ²	39.9	40.5 ²	28.3 ²	27.5 ²
186	Roadside	Diffusion Tube	58	Y	-	47.5	47.7 ²	45.8	42.7	23.1	24.5 ²
187	Roadside	Diffusion Tube	92	Y	-	50.7	50.2 ²	50.8	43.9 ²	25.7 ²	26.1
188	Roadside	Diffusion Tube	42	Y	-	49.8 ²	49.8 ²	52.4 ²	43.7 ²	32.5 ²	26.8 ²
190	Kerbside	Diffusion Tube	100	N	-	-	-	23.2	23.4	20.7	20.1
191	Roadside	Diffusion Tube	100	N	-	-	-	29.7	27.9	22.5	24.3
192	Roadside	Diffusion Tube	92	Y	-	-	-	39.7	38.6	30.8	31.7
194	Roadside	Diffusion Tube	100	N	-	-	-	22	20.4	15.8 ²	18.4
195	Roadside	Diffusion Tube	100	N	-	-	-	31.6	31.2	24.2 ²	24.6
196	Roadside	Diffusion Tube	100	N	-	-	-	24.9	25.2	19.4	22.0
198	Roadside	Diffusion Tube	100	Y	-	-	-	35.1	33.5	25.7	28.7
199	Roadside	Diffusion Tube	100	N	-	-	-	23.9	25	20.7	20.1
200	Roadside	Diffusion Tube	100	N	-	-	-	33.4	31.1	27.4 ²	27.4
201	Roadside	Diffusion Tube	83	N	-	-	-	30.3	28.9	22.1	24.0

202	Roadside	Diffusion Tube	100	N	-	-	-	27.8	27.6	23.3	24.5
203	Roadside	Diffusion Tube	100	N	-	-	-	21.6	20.6	17.2	17.1
204	Roadside	Diffusion Tube	92	N	-	-	-	23.3	22.1	18.7	20.1
207	Roadside	Diffusion Tube	100	N	-	-	-	21.7	20.6	16.7	18.3
208	Roadside	Diffusion Tube	100	N	-	-	-	25.4	24.9	18.9	20.5
209	Roadside	Diffusion Tube	100	N	-	-	-	22.7	22.3	15.2 ²	16.6
210	Roadside	Diffusion Tube	100	N	-	-	-	21.7	20.4	16.6	17.5
211	Roadside	Diffusion Tube	92	N	-	-	-	21.7	21.8	18.1	19.7
212	Kerbside	Diffusion Tube	92	Y	-	-	-	47.1 ²	41.3	33.4	37.4
214	Roadside	Diffusion Tube	100	Y	-	-	-	-	32.3	24.8	25.4
218	Roadside	Diffusion Tube	100	Y	-	-	-	-	35.5	28.2	31.6
220	Kerbside	Diffusion Tube	67	N	-	-	-	-	38.4 ²	27.9 ²	30.4 ²
221	Kerbside	Diffusion Tube	50	N	-	-	-	-	NA	30.4 ²	26.9 ²
224	Roadside	Diffusion Tube	92	N	-	-	-	-	23.1 ²	18.5 ²	18.8
243	Roadside	Diffusion Tube	100	N	-	-	-	-	-	25.7 ²	28.2
244	Roadside	Diffusion Tube	92	N	-	-	-	-	-	18.2	18.0
245	Roadside	Diffusion Tube	100	N	-	-	-	-	-	14.3	15.0

247	Roadside	Diffusion Tube	83	N	-	-	-	-	-	-	11.4
249	Roadside	Diffusion Tube	100	N	-	-	-	-	-	17.3	16.5
250	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	26.7 ²	28.4
251	Roadside	Diffusion Tube	100	N	-	-	-	-	-	13.5	14.9
254	Roadside	Diffusion Tube	92	N	-	-	-	-	-	-	27.7
255	Kerbside	Diffusion Tube	100	Y	-	-	-	-	-	-	25.8
256	Kerbside	Diffusion Tube	92	Y	-	-	-	-	-	-	25.3
257	Kerbside	Diffusion Tube	100	Y	-	-	-	-	-	-	26.2
258	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	29.4
TRO-001	Roadside	Diffusion Tube	58	N	-	-	-	-	-	10.9 ²	11.9
TRO-002	Roadside	Diffusion Tube	100	N	-	-	-	-	-	12.9 ²	13.4
TRO-003	Kerbside	Diffusion Tube	92	N	-	-	-	-	-	15.6	16.0
TRO-004	Roadside	Diffusion Tube	83	N	-	-	-	-	-	9.8 ²	11.9
TRO-005	Roadside	Diffusion Tube	100	N	-	-	-	-	-	11.5	11.6
TRO-006	Roadside	Diffusion Tube	92	N	-	-	-	-	-	17.0 ²	17.0
TRO-007	Roadside	Diffusion Tube	92	N	-	-	-	-	-	9.4	10.4
TRO-008	Roadside	Diffusion Tube	100	N	-	-	-	-	-	8.4	8.6

TRO-009	Roadside	Diffusion Tube	100	N	-	-	-	-	-	9.3	9.2
TRO-010	Kerbside	Diffusion Tube	83	N	-	-	-	-	-	10.5 ²	10.6
TRO-011	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	12.2	10.9
TRO-012	Roadside	Diffusion Tube	100	N	-	-	-	-	-	10.6	10.4
TRO-013	Kerbside	Diffusion Tube	92	N	-	-	-	-	-	9.9 ²	9.0
TRO-014	Roadside	Diffusion Tube	58	N	-	-	-	-	-	14.1	13.7
TRO-015	Roadside	Diffusion Tube	100	N	-	-	-	-	-	11.5	11.8
TRO-016	Roadside	Diffusion Tube	100	N	-	-	-	-	-	16.9	15.9
TRO-017	Roadside	Diffusion Tube	100	N	-	-	-	-	-	21.1	16.1
TRO-018	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	23.3
TRO-019	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	14.5
TR0-020	Kerbside	Diffusion Tube	67	N	-	-	-	-	-	-	14.7
TRO-021	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	17.2
TRO-022	Roadside	Diffusion Tube	92	N	-	-	-	-	-	-	19.3
TRO-023	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	19.5
TRO-024	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	29.6
TRO-025	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	15.3

TRO-026	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	14.8
TRO-027	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	16.4
TRO-028	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	13.4
TRO-029	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	14.4
TRO-030	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	13.8
TRO-031	Roadside	Diffusion Tube	92	N	-	-	-	-	-	-	10.5
TRO-032	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	10.0
TRO-033	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	11.1
TRO-034	Roadside	Diffusion Tube	92	N	-	-	-	-	-	-	10.3
TRO-035	Kerbside	Diffusion Tube	92	N	-	-	-	-	-	-	11.1
TRO-036	Kerbside	Diffusion Tube	67	N	-	-	-	-	-	-	11.3
TRO-037	Roadside	Diffusion Tube	25	N	-	-	-	-	-	-	4.1
TRO-038	Kerbside	Diffusion Tube	92	N	-	-	-	-	-	-	11.8
TRO-039	Kerbside	Diffusion Tube	83	N	-	-	-	-	-	-	13.4
TRO-040	Kerbside	Diffusion Tube	75	N	-	-	-	-	-	-	13.2
TRO-041	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	11.5
TRO-042	Kerbside	Diffusion Tube	83	N	-	-	-	-	-	-	13.4

TRO-043	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	7.9
TRO-044	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	8.0
TRO-045	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	10.7
GW-001	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	12.9
GW-002	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	11.8
GW-003	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	11.7
GW-004	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	22.4
GW-005	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	17.8
GW-006	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	19.6
GW-007	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	10.0
GW-008	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	17.9
GW-009	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	18.4
GW-010	Roadside	Diffusion Tube	100	N	-	-	-	-	-	-	19.0
GW-011	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	22.5
GW-012	Kerbside	Diffusion Tube	100	N	-	-	-	-	-	-	23.5

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 6 - Automatic Annual Mean NO₂ Monitoring Results (µg/m³)

Site Name	Site Type	Within AQMA?	Valid Data Capture 2021 %	NO ₂ Annual Mean Concentration (µg/m ³) 2017	NO ₂ Annual Mean Concentration (µg/m ³) 2018	NO ₂ Annual Mean Concentration (µg/m ³) 2019	NO ₂ Annual Mean Concentration (µg/m ³) 2020	NO ₂ Annual Mean Concentration (µg/m ³) 2021
City Centre AURN	Urban Background	N	93	20	18	12	16	16
Newport Road AURN	Roadside	N	99	-	-	29	19	22
Cardiff Castle Street	Roadside	Y	100	-	-	-	-	25

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

- (1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
- (2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 7 - AQMesh Indicative Annual Mean NO₂ Monitoring Results

AQMesh Site Name	Valid Data Capture 2021 %	NO₂ Annual Mean Concentration (µg/m³) 2021
Westgate Street	0	N/A
Lower Cathedral Road	100	19.9
Tudor Street	100	20
North Road	100	22.1
Penarth Road	100	12.7
Lansdowne Road, Canton	54	25.6
Llandaff AQMA	11	12

Notes:

AQMesh automatic monitors provide indicative data

Figure 16 – Trends in Non-Automatic Annual Mean NO₂ Concentrations in Cardiff City Centre AQMA

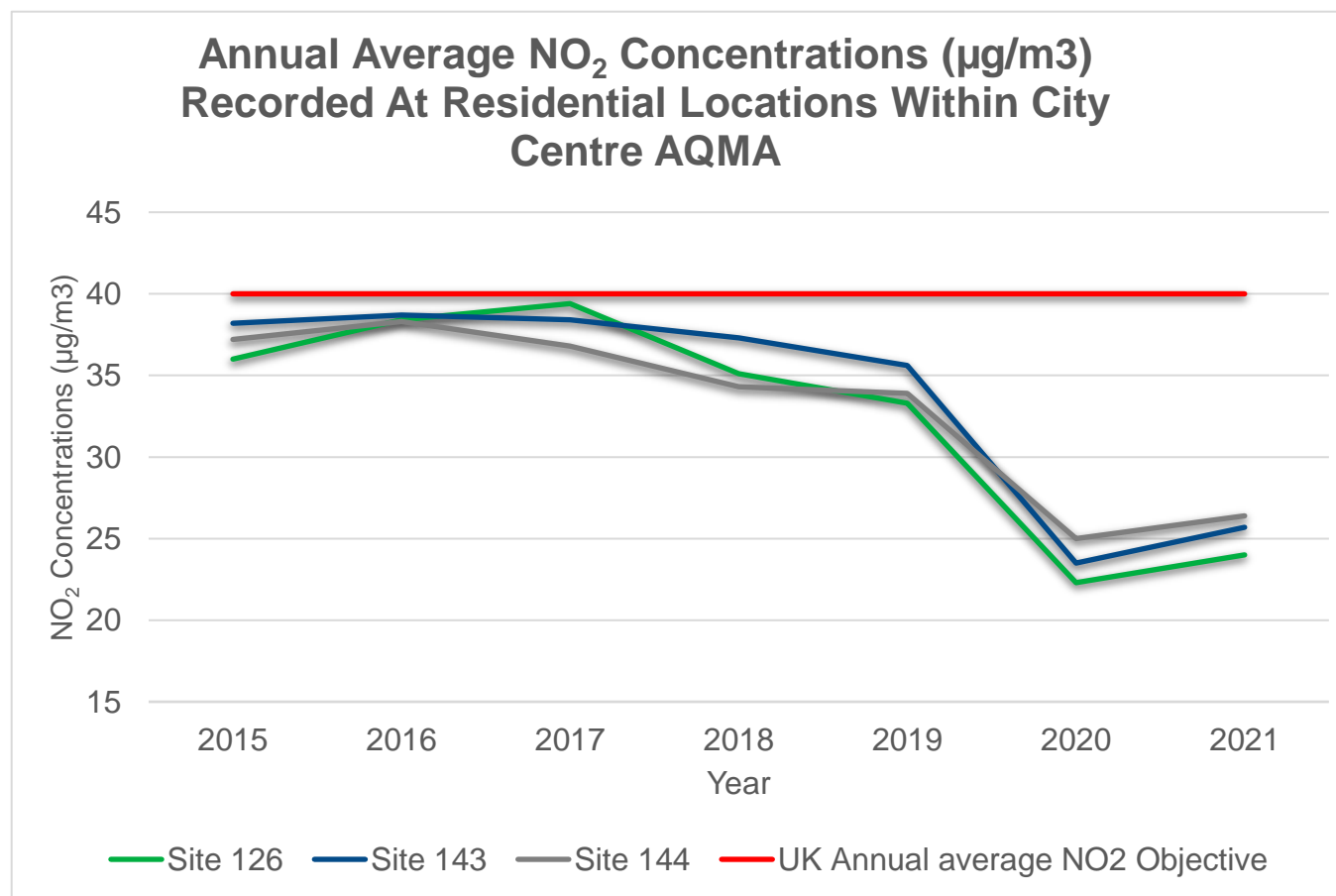


Figure 16 shows compliance with the Annual Air Quality Objective for NO₂ in 2021 within the Cardiff City Centre AQMA. An increase of up to 8% in NO₂ concentrations compared to 2020 was experienced at residential locations. In 2021 a reduction of 27% in NO₂ concentrations is seen, compared to pre-Covid 2019.

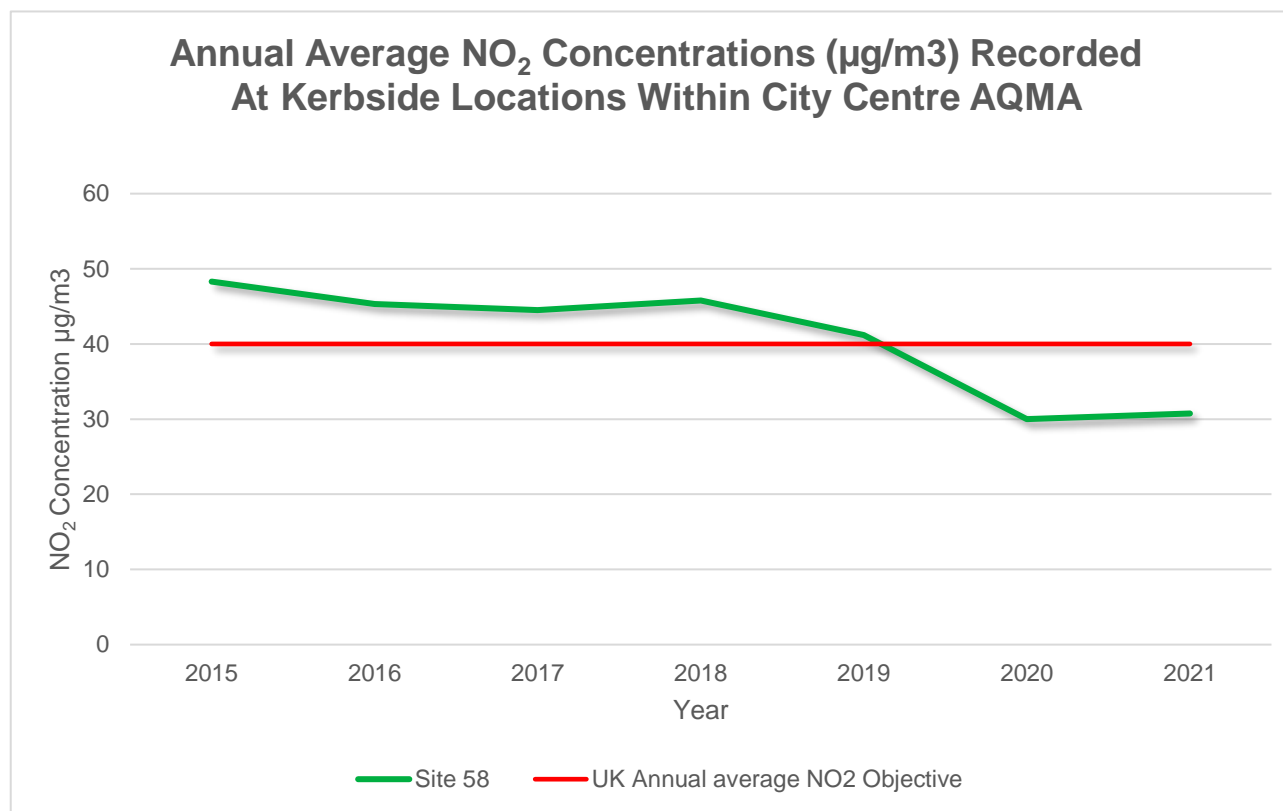
Figure 17 – Trends in Non-Automatic Annual Mean NO₂ Concentrations at Kerbside Locations Within Cardiff City Centre AQMA

Figure 16 displays compliance in 2021 with the Annual Air Quality Objective for NO₂ within the Cardiff City Centre AQMA kerbside locations.

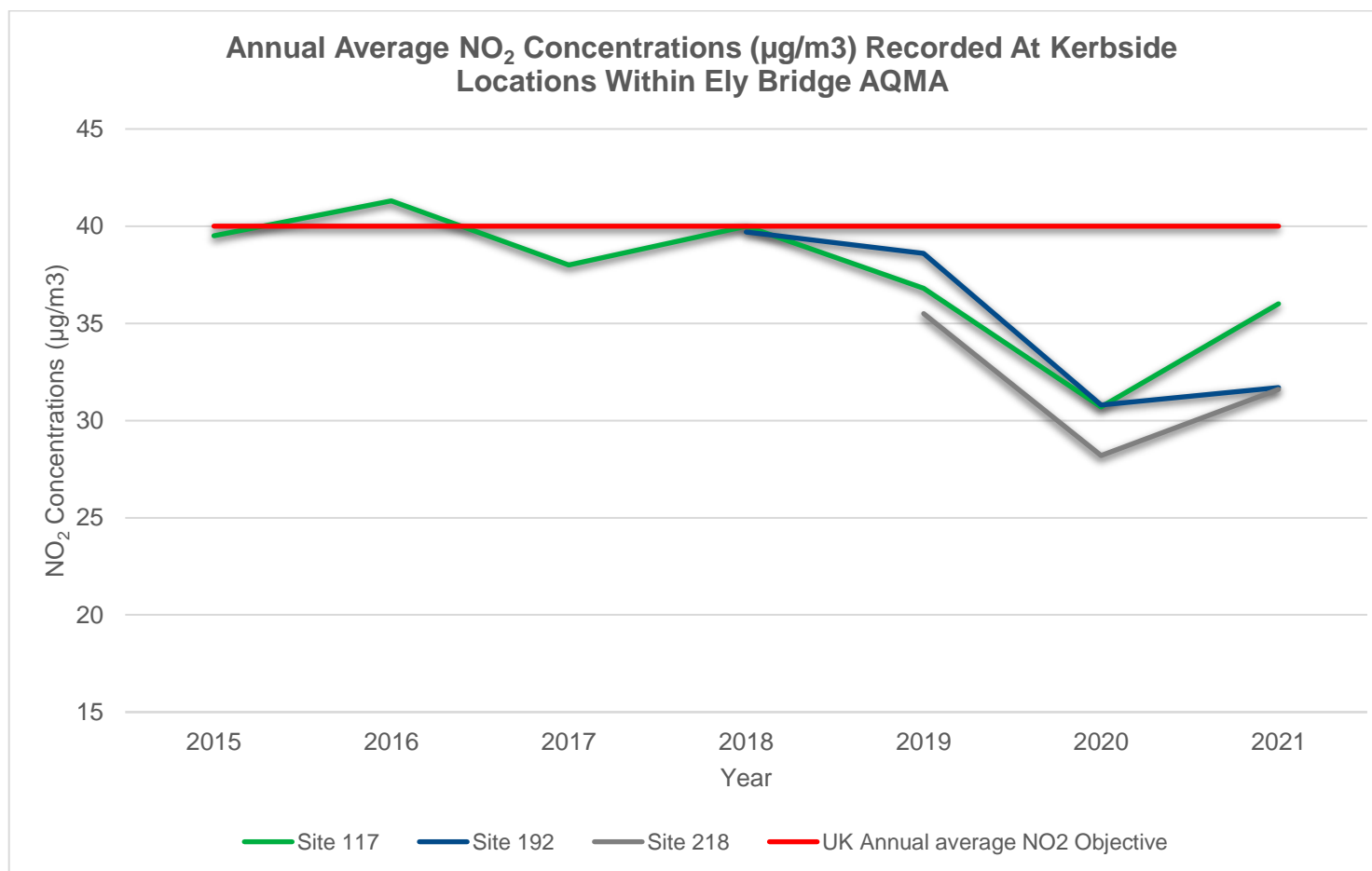
Figure 18 - Trends in Non-Automatic Annual Mean NO₂ Concentrations Ely Bridge AQMA

Figure 18 displays compliance with the Annual Air Quality Objective for NO₂ in 2021 within the Ely Bridge AQMA. An increase of up to 14% in NO₂ concentrations were experienced at residential locations compared to 2020.

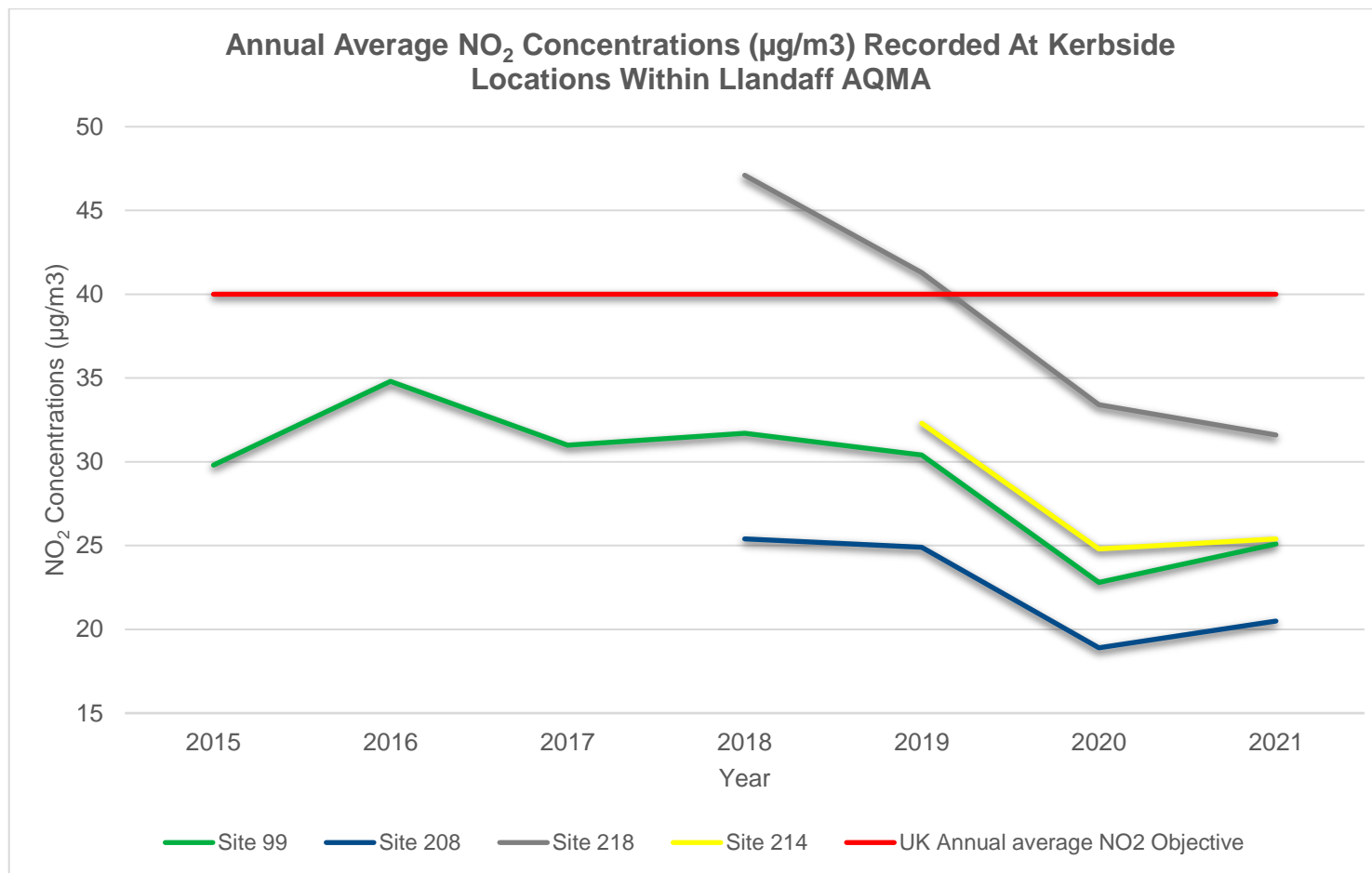
Figure 19 - Trends in Non-Automatic Annual Mean NO₂ Concentrations Llandaff AQMA

Figure 19 displays compliance in 2021 with the Annual Air Quality Objective for NO₂ within the Llandaff AQMA and a overall decreasing trend in NO₂ concentrations.

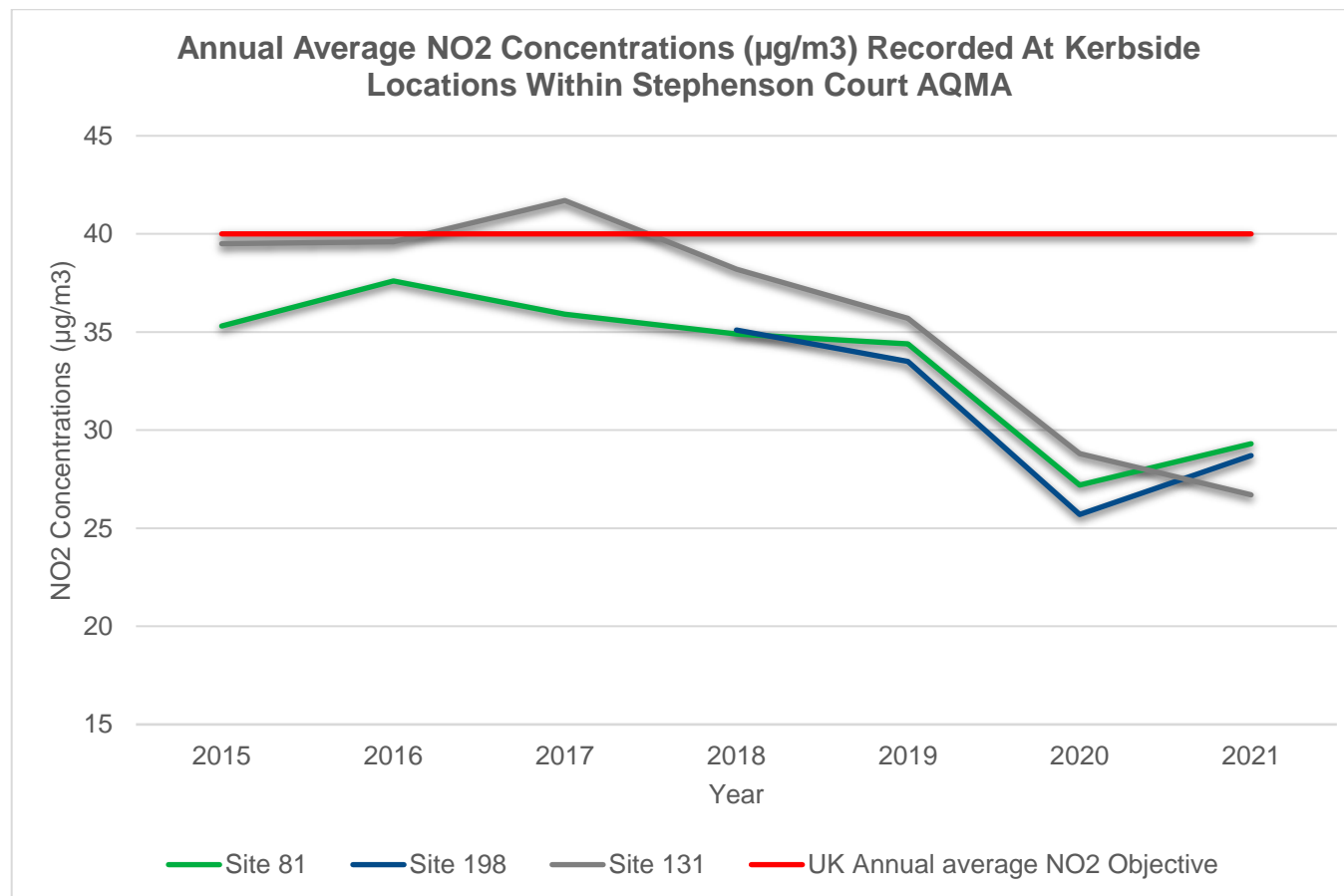
Figure 20 – Trends Non-Automatic Annual Mean NO₂ Concentrations Stephenson Court AQMA

Figure 20 displays compliance in 2021 with the Annual Air Quality Objective for NO₂ within the Stephenson Court AQMA. A decreasing trend in NO₂ concentrations since 2017 can be observed.

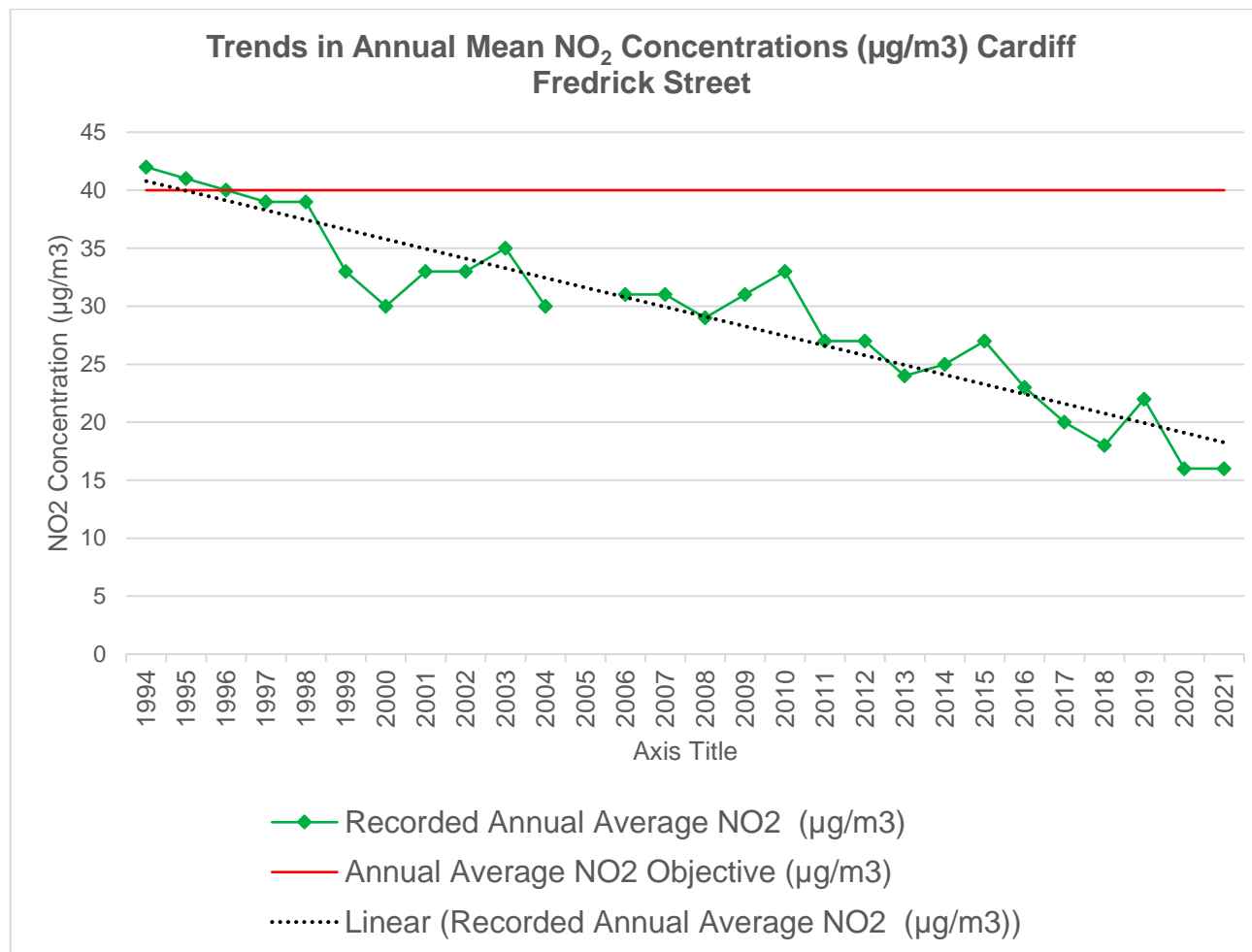
Figure 21 - Trends in Automatic Annual Mean NO₂ Concentrations Cardiff City Centre AURN

Figure 21 displays a decreasing trend in NO₂ concentrations experienced at the Cardiff City Centre AURN site.

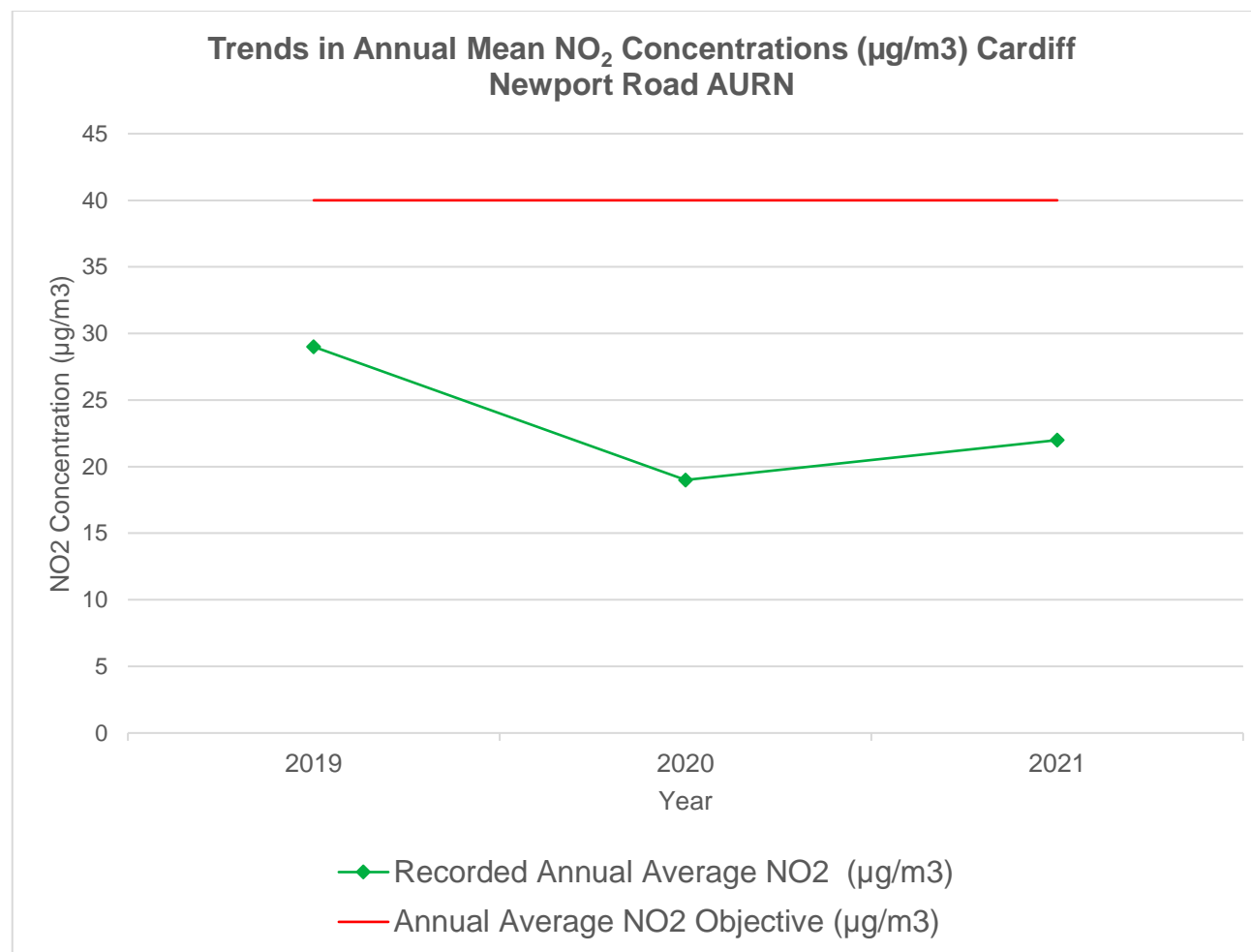
Figure 22 - Trends in Automatic Annual Mean NO₂ Concentrations Newport Road AURN

Figure 22 displays compliance with the Annual Air Quality Objective for NO₂ since 2019.

Table 8 - 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means > 200µg/m³

Site Name	Valid Data Capture 2021 %	Number of Hourly NO ₂ Means (> 200µg/m ³)		
		2019	2020	2021
City Centre AURN	93	0	0	0
Newport Road AURN	99	0	0	0
Cardiff Castle Street	100	-	-	0

Notes:

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 9 - Non-Automatic Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site Name	Valid Data Capture 2021 %	PM ₁₀ Annual Mean Concentration (µg/m ³) 2017	PM ₁₀ Annual Mean Concentration (µg/m ³) 2018	PM ₁₀ Annual Mean Concentration (µg/m ³) 2019	PM ₁₀ Annual Mean Concentration (µg/m ³) 2020	PM ₁₀ Annual Mean Concentration (µg/m ³) 2021
City Centre AURN	97	16	17	23	14	13
Newport Road AURN	97	-	-	19	17	17
Cardiff Castle Street	98	-	-	-	-	12

Notes:

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 10 - AQMesh Indicative Annual Mean PM₁₀ Monitoring Results

AQMesh Site Name	Valid Data Capture 2021 %	PM₁₀ Annual Mean Concentration (µg/m³) 2021
Westgate Street	0	N/A
Lower Cathedral Road	100	11.1
Tudor Street	100	13.9
North Road	100	9.5
Penarth Road	100	11.5
Lansdowne Road, Canton	54	16.6
Llandaff AQMA	11	9.3

Notes:

AQMesh automatic monitors provide indicative data

Figure 23 – Trends in Annual Mean PM₁₀ Concentrations Cardiff City Centre AURN

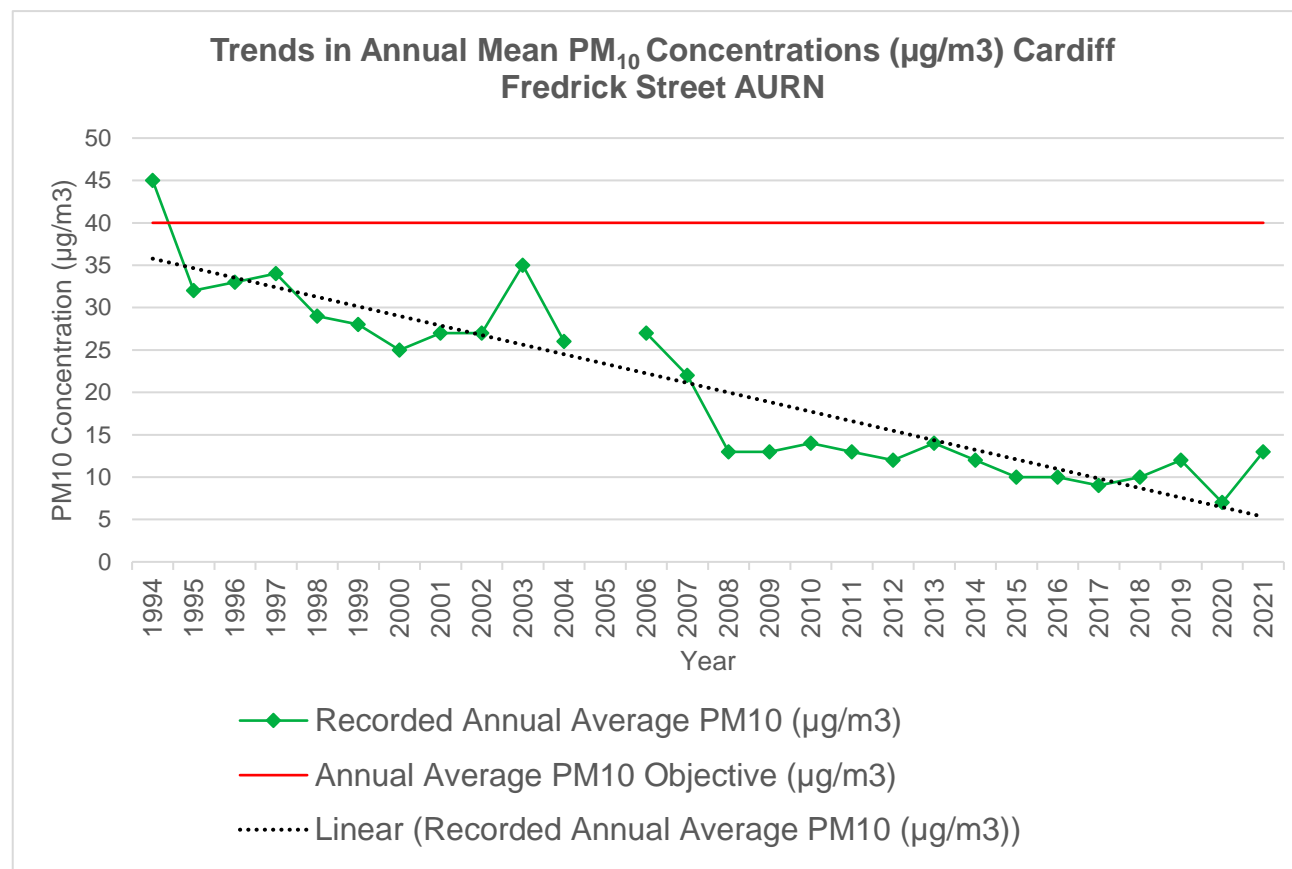


Figure 23 displays an overall decreasing trend in PM₁₀ concentrations at Cardiff City Centre AURN

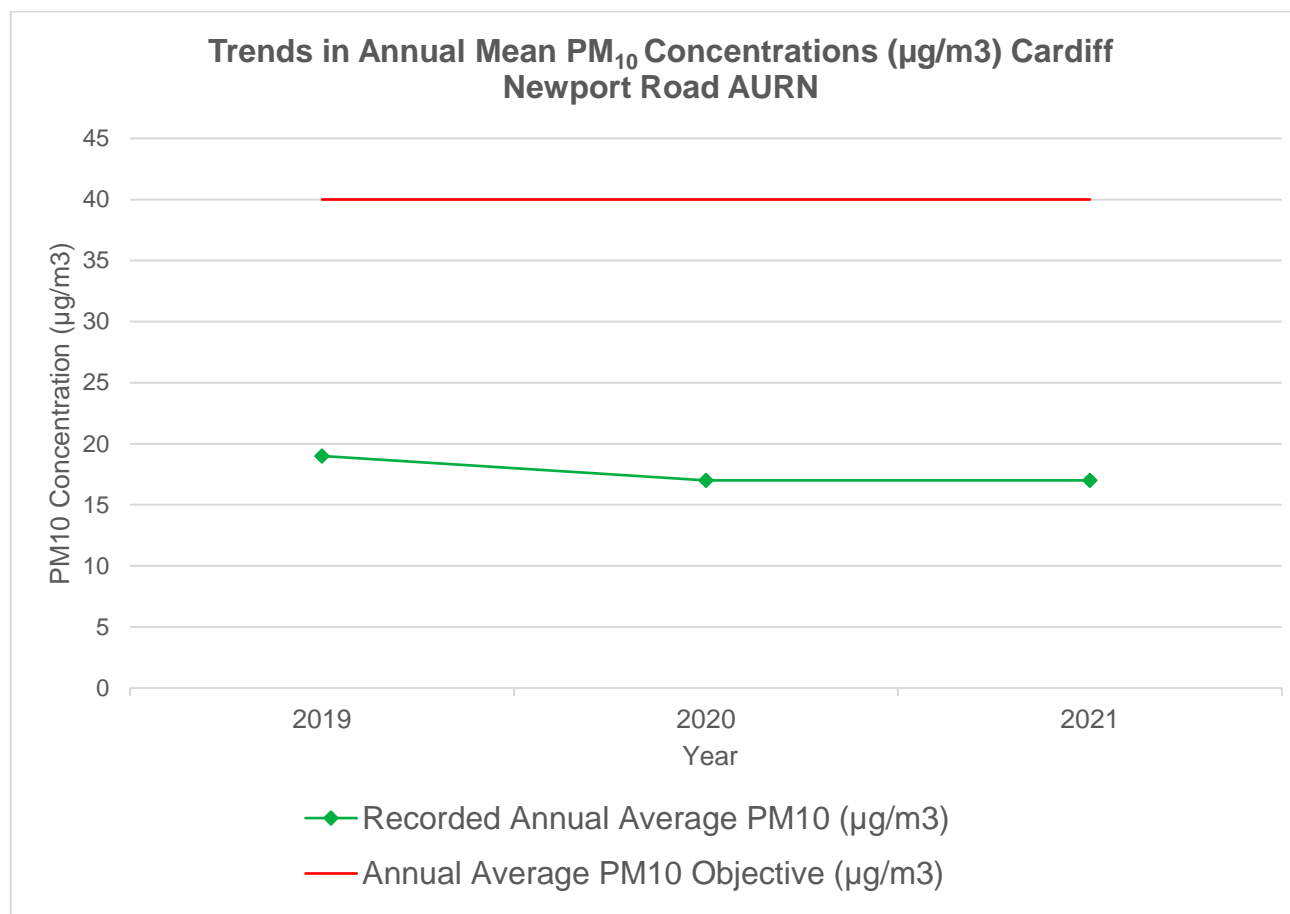
Figure 24 - Trends in Annual Mean PM₁₀ Concentrations Newport Road AURN

Figure 24 displays compliance with the Annual Air Quality Objective for PM₁₀ at the Newport Road AURN site since 2019.

Table 11 - 24-Hour Mean PM₁₀ Monitoring Results, Number of PM₁₀ 24-Hour Means > 50µg/m³

Site Name	Valid Data Capture 2021 %	PM ₁₀ 24 Hour Objective (50 µg/m ³) Exceedances		
		2019	2020	2021
City Centre AURN	97	0	0	0
Newport Road AURN	97	0	0	0
Cardiff Castle Street	98	-	-	0

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 12 – Automatic Annual Mean PM_{2.5} Monitoring Results

Site Name	Valid Data Capture 2021 %	PM _{2.5} Annual Mean Concentration (µg/m ³) 2020	PM _{2.5} Annual Mean Concentration (µg/m ³) 2021
Cardiff Castle Street	91	9	9

Notes:

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 13 - AQMesh Indicative Annual Mean PM_{2.5} Data

AQMesh Site Name	Valid Data Capture 2021 %	PM_{2.5} Annual Mean Concentration (µg/m³) 2021
Westgate Street	0	N/A
Lower Cathedral Road	99	8.5
Tudor Street	100	10.7
North Road	100	7.8
Penarth Road	100	9.5
Lansdowne Road, Canton	54	11.4
Llandaff AQMA	11	20.72

Notes:

AQMesh automatic monitors provide indicative data

AQMesh indicative concentrations

Indicative automatic monitoring was carried out at seven locations in Cardiff. The figures below display annual trend data for nitrogen dioxide and particulate matter for five of these sites. The data from Westgate Street and Llandaff AQMA AQmesh pods are not included due to insufficient data collection for the year due to technical issues.

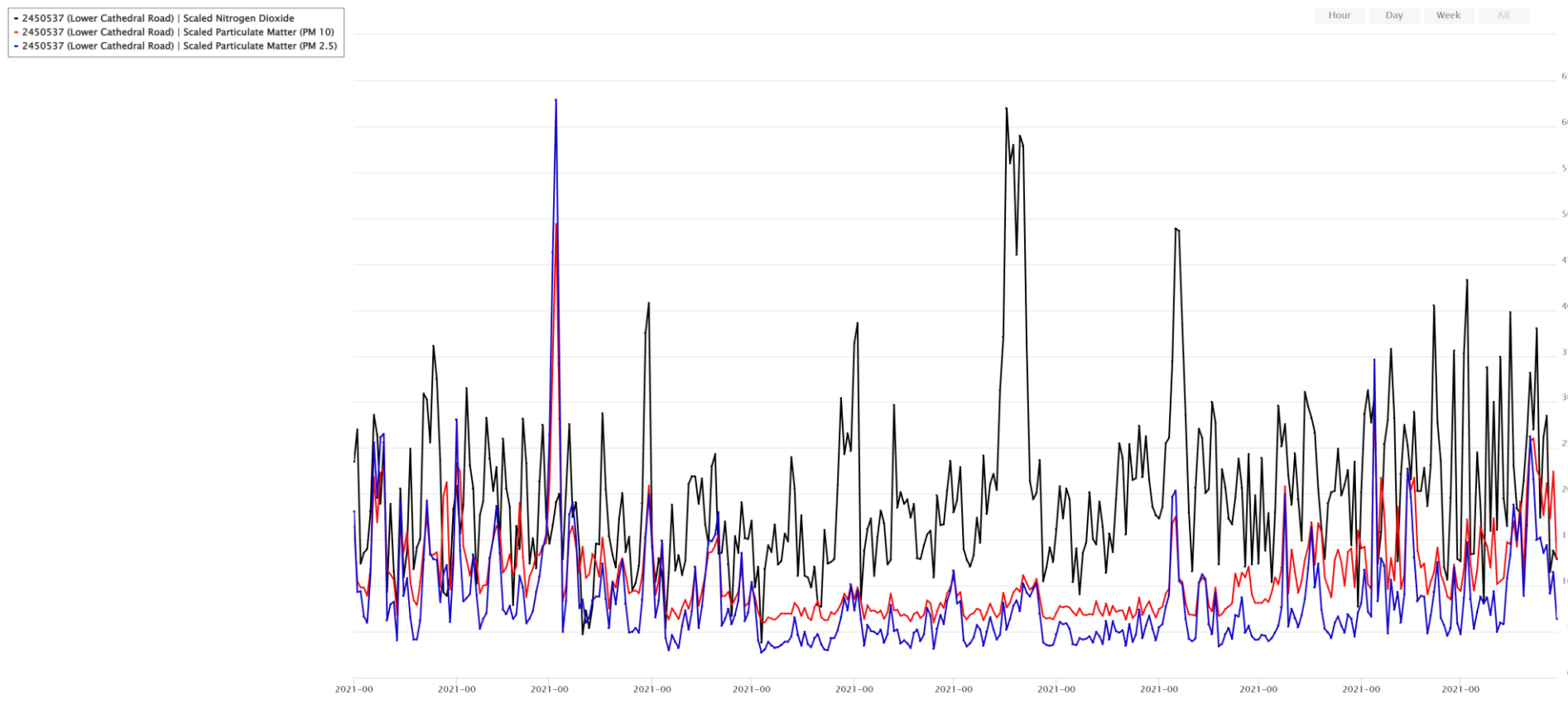
Figure 25 – Aqmesh Indicative Annual Trend Chart Lower Cathedral Road

Figure 25 displays data from Lower cathedral Road indicative automatic montitor for 2021.

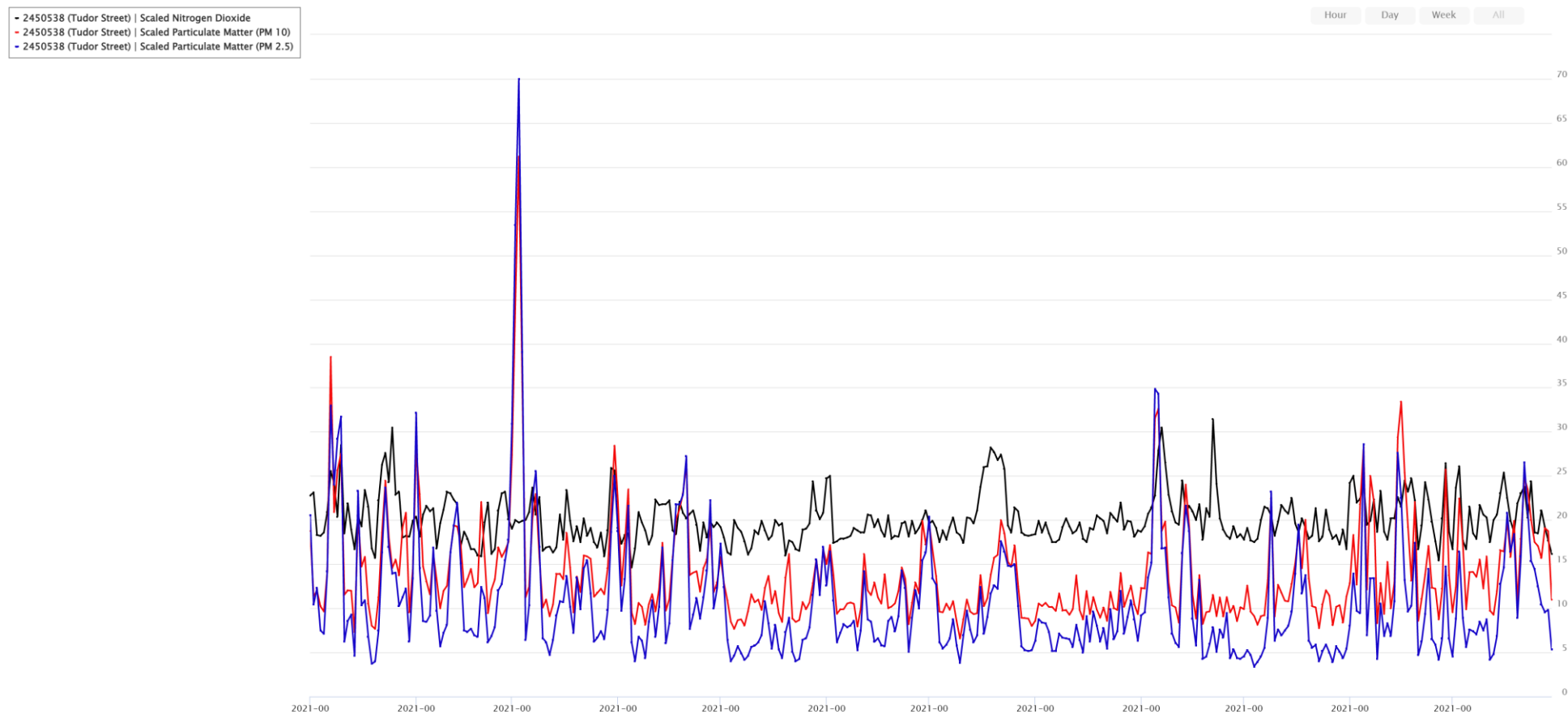
Figure 26 - AQMesh Indicative Annual Trend Chart Tudor Street

Figure 26 displays data from Tudor Street indicative automatic montitor for 2021.

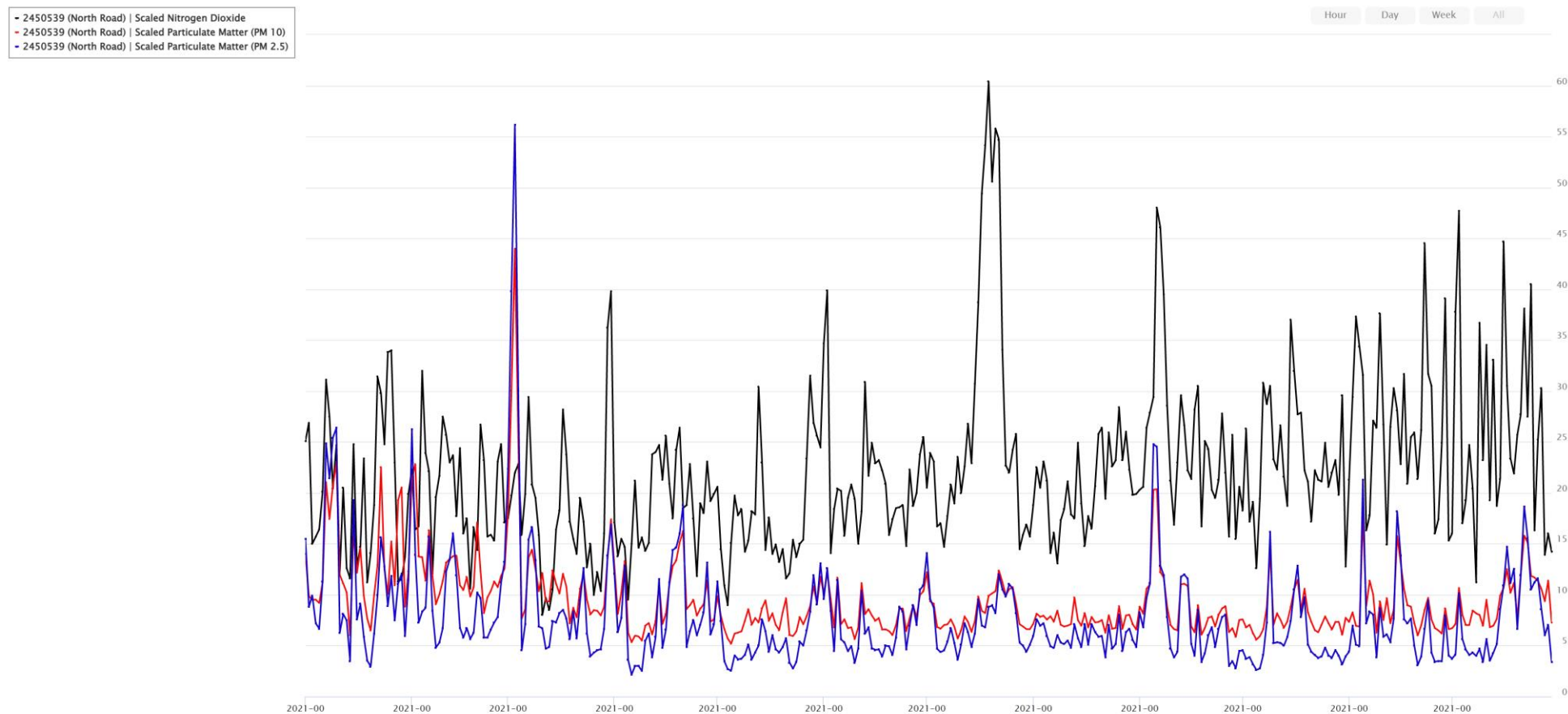
Figure 27 - AQMesh Indicative Annual Mean Trend Chart North Road

Figure 27 displays data from North Road indicative automatic monitor for 2021.

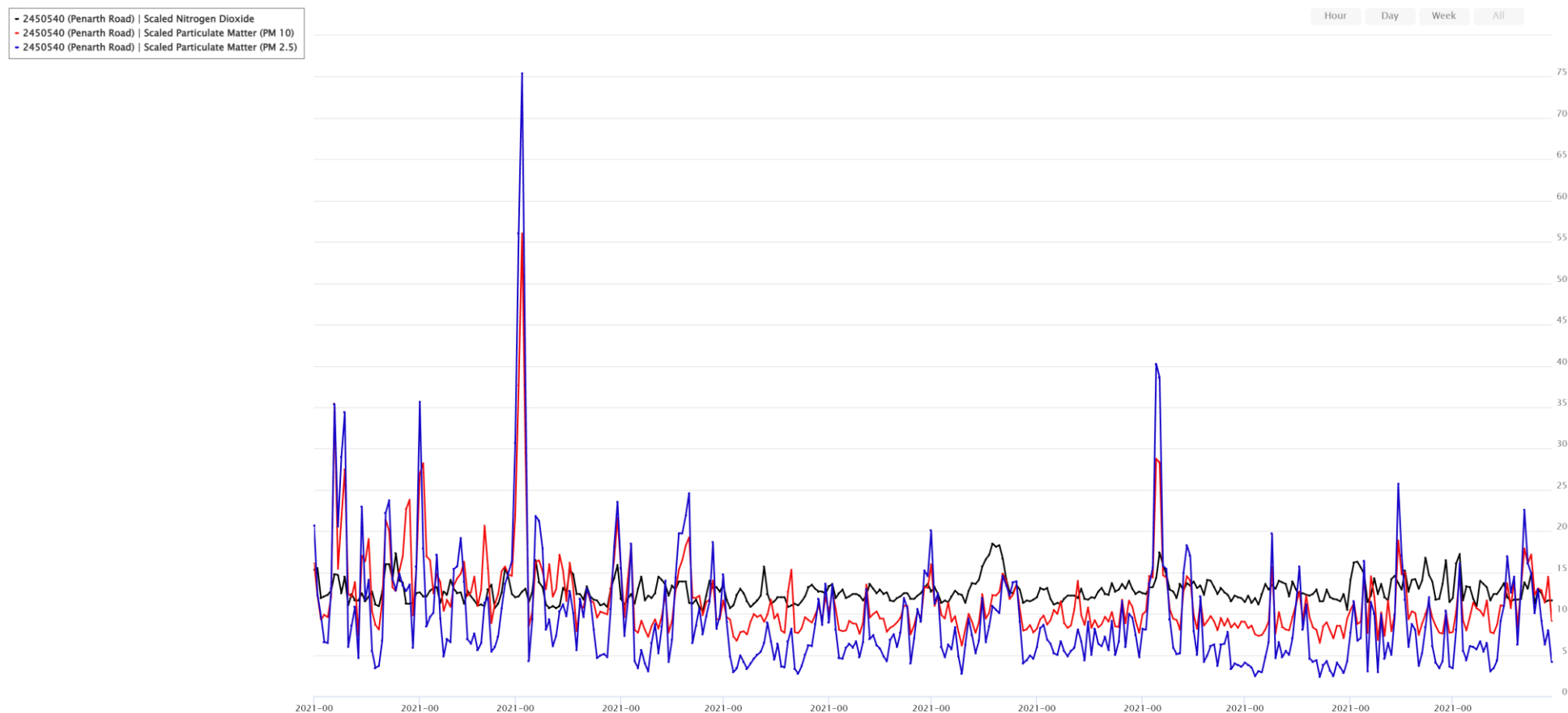
Figure 28 - AQMesh Indicative Annual Trend Chart Penarth Road

Figure 28 displays data from Penarth Road indicative automatic montitor for 2021.

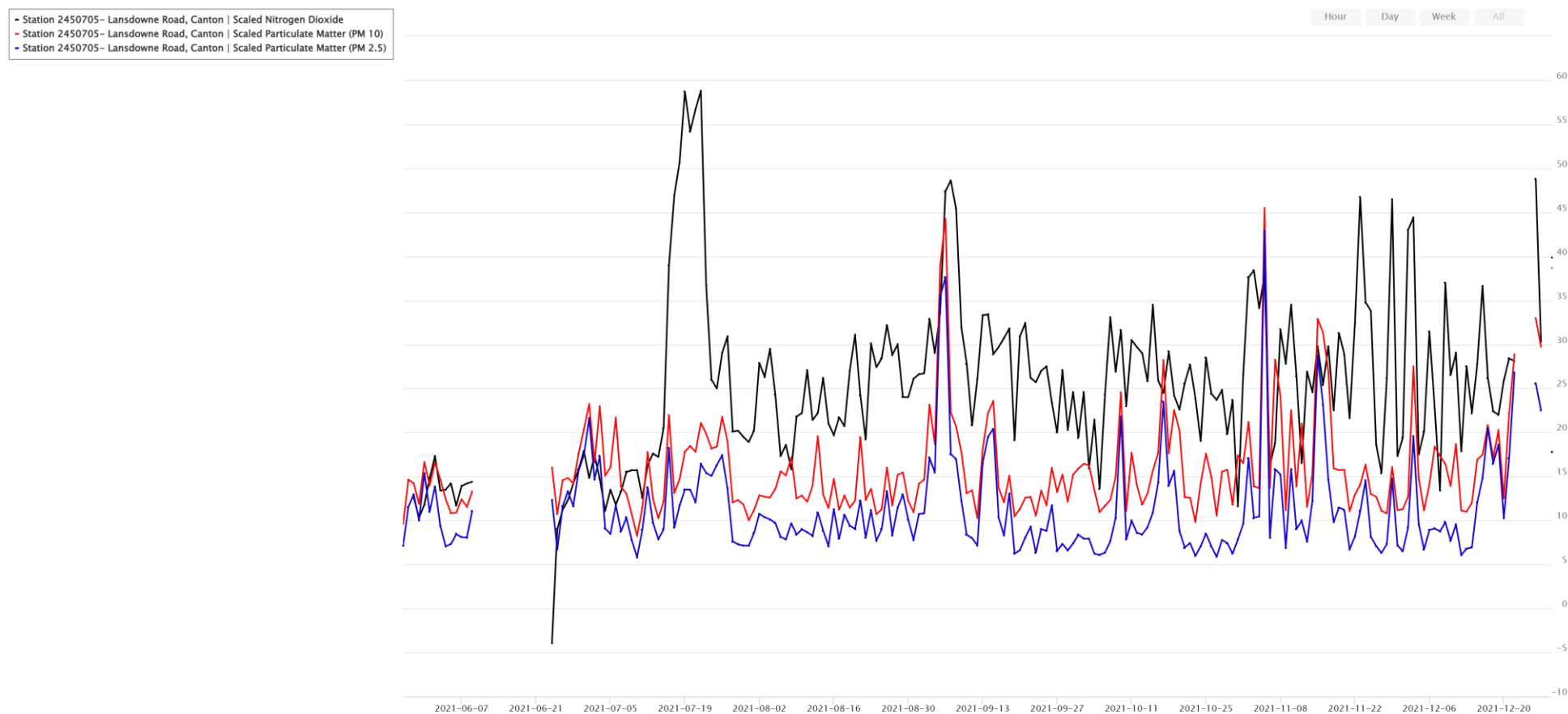
Figure 29 - AQMesh Indication Annual Trend Chart Lansdowne Road, Canton

Figure 29 displays data from Lansdowne Road indicative automatic montitor in 2021.

2.3 Comparison of 2021 Monitoring Results with Previous Years and the Air Quality Objectives

During 2021 monitoring was carried out for nitrogen dioxide (NO₂), particulate matter (PM₁₀), sulphur dioxide (SO₂), carbon monoxide (CO) and ozone (O₃). There was no monitoring undertaken for benzene or 1-3-butadiene in line with the requirements of the LAQM regime in Wales.

2.3.1 Nitrogen Dioxide (NO₂)

Nitrogen dioxide was measured during 2021 at three sites equipped with an automatic NO_x analyser and by a network of 96 diffusion tubes. NO₂ was also measured by seven indicative automatic monitors in various locations.

In order to ratify the 2021 diffusion tube dataset, a bias adjustment factor of 0.78 was applied to the annual average readings. The factor was derived from the Defra website which gave the average correction factor from 24 co-location studies across the UK, whereby the analytical laboratory and method used was the same as CC. The national bias correction factor was utilized as it would provide results representative of a worst-case scenario. The bias correction factor of 0.78 was obtained from the following website: <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

There were no exceedances in either the annual or short-term Air Quality Objectives for NO₂ at any automatic and non-automatic monitoring site during 2021. During 2020, due to COVID-19 restrictions resulting in decreased traffic numbers on our road, reductions in NO₂ concentrations were seen at most monitoring sites. Results from 2021 shows slightly increased NO₂ concentrations compared to 2020, but still maintain a reduction compared to 2019 pre-Covid.

2.3.2 Particulate Matter (PM₁₀)

As described in previous sections, monitoring of PM₁₀ has been carried out at the Cardiff Centre AURN, Newport Road AURN and Cardiff Castle Street monitoring sites. Summary data is given in Tables 9 and 11. The results of the monitoring indicate that recorded PM₁₀ concentrations at these monitoring stations are compliant with both the annual mean (40µg/m³) and 24-hour mean (>50 µg/m³ not to be exceeded more than 18 times per year) Air Quality Objectives set for PM₁₀.

2.3.3 Particulate Matter (PM_{2.5})

Monitoring for PM_{2.5} was carried out at the Cardiff Castle Street monitoring site. Results shown in Table 6 show an annual result of 9 µg/m³. There is no formal Air Quality Objective in Wales for PM_{2.5}, although this concentration is compliant with the EU target value of 25 µg/m³.

2.3.4 Other Pollutants Monitored

Sulphur Dioxide (SO₂)

Sulphur dioxide was measured at the Cardiff Centre AURN automatic monitoring site during 2021. The site is classified as “Urban Background” and is a relevant location for the 15-minute and 1-hour Objectives. There were no exceedances of the set objectives during 2021.

Ozone (O₃)

Ozone monitoring is useful due to its potential correlations with other pollutants. In 2021, ozone was measured at the Cardiff City Centre AURN site. The results are compared with the running 8-hour mean objective as set by the Expert Panel on Air Quality Standards (EPAQs) which states the running 8-hour mean should not exceed 100µg/m³ on more than 10 days per year. There were no exceedances of the ozone objective in Cardiff in 2021.

Carbon Monoxide (CO)

Carbon monoxide was also monitored at Cardiff City AURN site during 2021. There were no exceedances of the Air Quality Strategy Objective for (CO) 8-hour running mean > 10 mg/m³ during this period.

2.4 Summary of Compliance with AQS Objectives as of 2021

Shared Regulatory Services on behalf of Cardiff Council have examined the results from monitoring in all non AQMA locations. Concentrations are all below the Objectives, therefore no further action is required.

Results from monitoring in AQMA locations show concentrations, although improving, are still relatively close to the Air Quality Objectives at some monitoring points. Therefore, these AQMAs will remain under review.

3 New Local Developments

3.1 Planning Applications

The Council continues to monitor the impact of proposed developments and recent developments already underway or in use.

The following developments may either be of significance in respect of local air quality or be a proposed development where air quality is a consideration.

20/01110/MJR Velindre construction access

Application was received for the temporary construction access route for the construction of the approved Velindre Cancer Centre, for a period of no more than 48 months following the completion of the related highway improvement works.

A revised air quality assessment (AQA) was undertaken as part of this application to ascertain the likely air quality impacts associated with the amended proposal through its construction phase. The results from the assessment show that the changes in construction traffic on Pendwyallt Road and Park Road from using this access route is expected to have a negligible air quality impact on nearby sensitive human health or ecological receptors. The predicted concentrations of pollutants at receptors also remain well below the air quality objectives and therefore the air quality impacts associated with the southern access route are considered to be not significant in accordance with guidance set out by EPUK and IAQM.

As such no specific planning condition was initially requested for further mitigation in terms of air quality impacts. However the planning committee, took into consideration a number of concerns raised by local residents placed the following condition on the approval notice dated 2nd February 2021:

Condition 11: Prior to commencement of the development hereby approved details of an air monitoring unit and its location shall be submitted to and approved in writing with the Local Planning Authority. The monitoring unit shall be implemented in accordance with the approved details and remain operational until cessation of the development. Data from the air monitoring unit shall be provided to the Local Planning Authority on request.

Reason: To monitor air quality in accordance with Policy EN13 of the adopted Cardiff Local Plan (2006-2026).

The developer's appointed consultants have now installed automatic air monitoring units at various locations along the access road measuring nitrogen dioxide and particulate matter as well as implementation of a diffusion tube monitoring program. Monthly reports are issued displaying data collected in this area and can be found at the following link, <https://velindre.nhs.wales/transforming-cancer-services/news/tcs-news/air-quality/air-quality-documents/>.

21/01666/MJR Land at Channel View Road, Grangetown, Cardiff

HYBRID APPLICATION FOR MIXED-USE DEVELOPMENT. OUTLINE PERMISSION FOR: THE REDEVELOPMENT AND EXTENSION OF PART OF THE CHANNEL VIEW ESTATE FOR UP TO 319 RESIDENTIAL APARTMENTS AND HOUSES, UP TO 285 SQ.M OF RETAIL FLOORSFACE (USE CLASS A1), COMMUNAL GARDENS INCORPORATING ALLOTMENTS AND PICNIC AREAS, FORMAL AND INFORMAL CHILDREN'S PLAY SPACE, LANDSCAPING, CYCLEPATHS/FOOTPATHS, DRAINAGE INFRASTRUCTURE, ROADS AND PARKING; THE REGENERATION OF THE MARL PUBLIC OPEN SPACE TO INCLUDE NEW/IMPROVED SPORTS PITCHES, CHILDREN'S PLAY SPACE, A NEW 'BEACH', WATER FEATURES, LANDSCAPING, AND CYCLEPATHS/FOOTPATHS; THE PROVISION OF A NEW BUS/CYCLE/PEDESTRIAN LINK BETWEEN CHANNEL VIEW ROAD AND SOUTH CLIVE STREET AND A NEW CYCLE/PEDESTRIAN LINK BETWEEN SOUTH CLIVE STREET AND FERRY ROAD; THE PROVISION OF A NEW PARKING AREA; TOGETHER WITH ASSOCIATED WORKS (ALL MATTERS RESERVED FOR FUTURE CONSIDERATION). FULL PERMISSION IS SOUGHT FOR A FIRST PHASE OF DEVELOPMENT COMPRISING OF NEW TOWER BLOCKS (8-13 STOREYS) PROVIDING 81 OLDER-PERSONS (OVER 55S), COMMUNITY-LIVING ACCOMMODATION UNITS, A 115SQ.M COMMUNITY CAFE, COMMUNAL GARDENS INCORPORATING ALLOTMENTS AND PICNIC AREAS, LANDSCAPING, DRAINAGE INFRASTRUCTURE, FOOTPATHS, ROADS, PARKING AND ASSOCIATED WORKS. | LAND AT CHANNEL VIEW ROAD, GRANGETOWN, CARDIFF.

A planning application was received for a proposed 319 residential apartments and houses with associated redevelopment in the area. An air quality assessment was submitted for review, and it was determined that during the construction phase, without mitigation measures in place the risk of dust emissions are high at the worst effected receptors. The assessment detailed highly recommended mitigations to reduce or

eliminate dust emissions. With these mitigation measures in place, it was determined the risk of adverse effects due to emissions from the construction phase will not be significant.

For the operational phase of the assessment, detailed modelling has been carried out to assess the impact of air quality on existing and proposed human and ecological receptors within the area of the development. It concluded that in terms of NO₂, PM₁₀ and PM_{2.5} exposure, the impact description of effects of changes in traffic flow as a result of the proposed development is determined to be 'negligible' at all existing receptors, and no mitigation measures are required. This application is awaiting decision.

21/02687 Red dragon centre and County Hall, Atlantic Wharf, Cardiff

HYBRID PLANNING APPLICATION FOR THE PROPOSED DEVELOPMENT OF PART OF A MIXED USE MASTERPLAN WITHIN THE INNER HARBOUR, CARDIFF BAY. INCLUDING OUTLINE DETAILS FOR UP TO 890NO. RESIDENTIAL DWELLINGS (USE CLASS C3), 1,090NO. HOTEL BED SPACES (USE CLASS C1), 19,500SQM OF EMPLOYMENT FLOORSPACE (USE CLASS B1), 27,500SQM OF LEISURE FLOORSPACE (USE CLASSES D1 AND D2) AND 12,310SQM OF RETAIL FLOORSPACE (USE CLASSES A1 AND A3). PLUS ASSOCIATED PUBLIC REALM, OPEN SPACE, HARD AND SOFT LANDSCAPING, DRAINAGE, WALKING, CYCLING, CAR PARKING AND OTHER TRANSPORT INFRASTRUCTURE. TOGETHER WITH FULL DETAILS FOR A MULTI-USE, INDOOR ARENA (USE CLASS D2) WITH SUPPORTING USES AND CAFE (USE CLASS A3) A 182NO. BED SPACE HOTEL (USE CLASS C1) PLUS ASSOCIATED PUBLIC REALM, HARD AND SOFT LANDSCAPING, DRAINAGE, WALKING, CYCLING, CAR PARKING AND OTHER TRANSPORT INFRASTRUCTURE.

A planning application was submitted detailing the above. An Air Quality Assessment (AQA) was carried out to assess the impact of the proposed development during construction and operational phases.

The significance of the overall effects of the Proposed Development has been assessed for baseline conditions only at this time. This assessment is based on professional judgement and takes into account a number of factors, including:

- Baseline pollutant concentrations of NO₂, PM₁₀ and PM_{2.5} in 2019, 2025 and 2032 are below the relevant objectives and limit values at all existing receptors considered, with the exception of one exceedance for NO₂ at one specific modelled receptor (ESR 8) in 2019, which is predicted to be well below the objective level in 2025 and 2032;

- Impacts on concentrations of NO₂, PM₁₀ and PM_{2.5} are expected to be 'negligible' in all scenarios, with the exception of a 'slight beneficial' impact on NO₂ concentrations at ESR 1 in both the 2025 Opening Year and 2032 Future Year, which is a result of the proposed closure of Hemingway Road when the development is in place; and
- Concentrations of NO₂, PM₁₀ and PM_{2.5} are predicted to be below the objective and target levels at assessed Proposed Sensitive Receptor Locations representing the planned residential and hotel uses within the site.

It is considered that, with the application of mitigation measures during the construction phase as outlined within the AQA, the potential for generation of nuisance dust and particulate matter will be greatly reduced, and any residual effect will be 'Not Significant'.

Taking into account that there are no predicted exceedances of relevant air quality objectives and target levels and mainly negligible impacts, the residual effect of the proposed development on human receptors during the operational phase is considered to be 'Not Significant'. This application is awaiting decision.

3.2 Road Traffic Sources (and Other Transport)

3.2.1 Narrow congested streets with residential properties close to the kerb

Cardiff Council has considered road traffic sources extensively in both this and each year in earlier reports; the monitoring network is very largely focused on measuring concentrations of nitrogen dioxide close to many of them. These have been discussed either in previous reports or earlier in this report.

There are no newly identified road traffic sources which need to be considered.

For 2021 SRS on behalf of Cardiff Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2.2 Busy streets where people may spend one hour or more close to traffic

Datasets collected from improved monitoring locations along Kingsway/ Duke Street/ Castle Street Link area have been compared to the 1-hour objective set for NO₂ due to the fact each site is known for commercial use at ground floor level. Levels are shown to be compliant with the objective.

An air monitoring station has been operational on Castle Street since December 2020 as part of the Welsh Automated Monitoring Network. Details of this site can be found in Table 3 and <https://airquality.gov.wales/>.

SRS on behalf of Cardiff Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.2.3 Roads with high flows of buses or HGVs

Other than Westgate Street, there are no roads in Cardiff where buses, coaches and HDVs account for >20% of road traffic, where flow of these vehicles is >2500 and there is relevant exposure within 10m of the kerb.

SRS on behalf of Cardiff Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

3.2.4 Junctions

Junctions have been fully considered in previous annual reviews and assessments.

SRS on behalf of Cardiff Council can confirm that there are no new/newly identified busy junctions/busy roads where exceedances of either the nitrogen dioxide or PM₁₀ objectives are likely.

3.2.5 New roads constructed or proposed since the last assessment

SRS on behalf of Cardiff Council confirms that there are no new/newly constructed roads since the last assessment.

3.2.6 Roads with significantly changed traffic flows

Ratified traffic data has been examined and there are no roads in Cardiff which have experienced traffic flow (AADT) growth of 25% or more in the preceding three years.

There is increasing evidence from the traffic measurements both locally and regionally to suggest that, for economic and other reasons, traffic growth on major routes has stopped year-on-year and may even have declined recently. This has, for example, resulted in a number of air quality assessments submitted with planning applications assuming current levels of road traffic as a worst-case scenario.

It should be noted that Cardiff Council is actively implementing its traffic management policy of a 50:50 modal split, i.e. 50% of journeys being made other than by the private car. This is not just for new developments but also for the local road network as a whole.

The Council is currently considering planning applications for significant housing and mixed used developments at a number of “strategic sites” across the city.

SRS on behalf of Cardiff Council can confirm that there are no new/newly identified roads with significantly changed traffic flows.

3.2.7 Bus or Coach Stations

SRS on behalf of Cardiff Council can confirm that there are no new/newly identified bus or coach stations since the last assessment.

Work at the Central Square Transport Interchange is ongoing and is due for completion in 2022.

3.2.8 Airports/ Diesel or Steam Trains / Ports and Shipping

There are no airports in Cardiff. The nearest airport is Cardiff International which is located approximately 15 miles to the west of Cardiff in The Vale of Glamorgan Council's area.

There are no airports planned or proposed within the Council's area.

Cardiff is well-served by passenger rail transport. The main Swansea to London Paddington line is served by Cardiff Central Station. Additionally, there is a network of local-line services running, in the main, to the valleys north of Cardiff. LAQM.TG(22) suggests that SO₂ emissions from diesel locomotives may be significant if there are outdoor locations where locomotives are regularly stationary for more than 15minutes and where members of the public could be regularly exposed over this period at such locations. LAQM.TG(22) also requires consideration exposure to nitrogen dioxide within 30m of certain specified railway lines in those areas where the annual mean background concentration is above 25µgm⁻³

Stationary trains have been considered fully in earlier reports with regard to potential exceedances of the sulphur dioxide objective. No potential exceedances were found, and nothing has changed in this regard since then. There is no need to further assess this source.

It should be recorded that works are now underway in preparation for the electrification of

the main Swansea/Cardiff to London Paddington line. The effects of this on local emissions can be only beneficial.

Discussions with regard to the electrification of the local line network are ongoing.

SRS on behalf of Cardiff Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

3.3 Industrial / Fugitive or Uncontrolled Sources / Commercial Sources

3.3.1 Industrial installations: new or proposed installations for which an air quality assessment has been carried out.

SRS on behalf of Cardiff Council can confirm that in 2021 there were no new or proposed industrial installations for which an air quality assessment has been carried out.

3.3.2 Industrial installations: existing installations where emissions have increased substantially or new relevant exposure has been introduced.

SRS on behalf of Cardiff Council can confirm that in 2021 there were no existing industrial installations where emissions have increased substantially or a new relevant exposure has been introduced.

3.3.3 Industrial installations: new or significantly changed installations with no previous air quality assessment.

SRS on behalf of Cardiff Council can confirm that in 2021 there were no new or significantly changed installations with no previous air quality assessment.

3.3.4 Major fuel storage depots storing petrol

As reported in the 2012 USA, there is one major fuel (petrol) storage depot in Cardiff in Cardiff Docks which was assessed in previous reports. This installation is subject to an EPR Permit and regulated by the Council. Capacity and throughput at this site has not altered significantly for the worse since the last assessment and no new relevant exposure exists.

SRS on behalf of Cardiff Council can confirm that there are major fuel (petrol) storage depots within the Local Authority area, but these have been considered in previous reports.

3.3.5 Petrol Stations

There are no new petrol stations in Cardiff with throughputs greater than 2000m³ per annum with a busy road nearby where there is relevant exposure within 10m of the pumps.

It is not necessary, therefore, to consider this further.

SRS on behalf of Cardiff Council can confirm that there are no petrol stations meeting the specified criteria.

3.3.6 Poultry Farms

The criteria for assessing poultry farms are set out in Table 7.3, point 4 of TG(22) (Defra, 2022). No farms exceeding the relevant criteria (turkey units with greater than 100,000 birds, naturally ventilated units with greater than 200,000 birds or mechanically ventilated units with greater than 400,000) have been identified.

SRS on behalf of Cardiff Council can confirm that there are no poultry farms meeting the specified criteria.

3.3.7 New Developments with Fugitive or Uncontrolled Sources

There are no new locations where fugitive could occur which have not been covered by previous rounds of review and assessment and no locations where new relevant exposure has been introduced to existing locations.

It is not considered necessary to consider this further at this time.

SRS on behalf of Cardiff Council can confirm that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

3.4 Other Sources

3.4.1 Domestic Wood Burners

Previous reports have confirmed that there are no known areas in Cardiff where coal or solid fuel burning provides a significant level or primary household heating. Nothing has changed in this regard since the 2018 APR, despite the potential for increasing popularity of solid fuel heating with increased fossil-fuel prices, and there is no need to consider this further at this time.

It should be noted that the Council receives a number of enquiries each year from residents in respect of national or local requirements were they to wish to install log-burners or similar appliances in their homes. There are no smoke control area in Cardiff and hence no legal requirements with regard to appliances that may be installed.

However, residents are always reminded of the legislation in respect of statutory smoke nuisance and, where they can't be persuaded otherwise for reasons of air quality and health, recommended to seek out an appliance certified for use in a smoke control area.

SRS on behalf of Cardiff Council can confirm that there are no areas of significant domestic fuel use in the Local Authority area.

4 Policies and Strategies Affecting Airborne Pollution

4.1 Local / Regional Air Quality Strategy

4.1.1 Cardiff's Clean Air Strategy and Action Plan

SRS on behalf of Cardiff Council have coordinated and developed a Clean Air Strategy (CAS) & Action Plan document. The document outlines a citywide approach to mitigate poor air quality in Cardiff and recognises that interventions to address poor air quality cannot be utilised in silo and implemented locally. Therefore citywide measures need to be put into practise to hopefully provide citywide improvements to air quality.

The document fulfils the requirements of the LAQM process to produce an Air Quality Action Plan (AQAP). The document also captures the Direction given to CC in March 2018 by WG for Cardiff to address its air quality concerns along highlighted major road networks

4.2 Air Quality Planning Policies

4.2.1 Cardiff's Local Development Plan 2006-2026

Cardiff's LDP 2006-2026, forms the basis for decisions on land use planning in Cardiff up to 2026 and assumes that, within the plan's time frame, approximately 40,000 new jobs and 41,100 new dwellings will be developed in Cardiff as a direct response to Cardiff's role as the economic driver of the City- region.

In addition to its independent examination, the LDP was subject to a Strategic Environmental Assessment (SEA) to ensure that the policies reflect sustainability principles and take into account environmental impacts.

Policy KP2 of the LDP allocates 8 Strategic Sites to help meet the need for new dwellings and jobs. These strategic allocations on both greenfield and brownfield sites will include 500 homes or more and/or include significant employment/mixed uses which will bring significant benefits to the city. The sites are:

- (i) Cardiff Central Enterprise Zone;
- (ii) Former Gas Works, Ferry Road;

- (iii) North West Cardiff;
- (iv) North of Junction 33 on the M4;
- (v) South of Creigiau;
- (vi) North East Cardiff (West of Pontprennau);
- (vii) East of Pontprennau Link Road; and
- (viii) South of St. Mellons Business Park – Employment Only.

The LDP identifies that sustainable transportation solutions are required in order to respond to the challenges associated with new development by setting out an approach aimed at minimising car travel, maximising access by sustainable transportation and improving connectivity between Cardiff and the wider region.

The Plan sets out a strategy to achieve this by making the best use of the current network, managing demand and reducing it where possible by widening travel choices. The aim is to secure a modal split of 50% car and 50% non-car modes.

The following LDP policies are of relevance to air quality;

KP8: SUSTAINABLE TRAVEL

For Cardiff to accommodate the planned levels of growth, existing and future residents will need to be far less reliant on the private car. Therefore, ensuring that more everyday journeys are undertaken by sustainable modes of transport, walking, cycling and public transport, will be essential.

Development in Cardiff will be integrated with transport infrastructure and services in order to:

- i. Achieve the target of a 50:50 modal split between journeys by car and journeys by walking, cycling and public transport.
- ii. Reduce travel demand and dependence on the car;
- iii. Enable and maximise use of sustainable and active modes of transport;
- iv. Integrate travel modes;
- v. Provide for people with particular access and mobility requirements;
- vi. Improve safety for all travellers;
- vii. Maintain and improve the efficiency and reliability of the transport network
- viii. Support the movement of freight by rail or water; and
- ix. Manage freight movements by road and minimise their impacts

KP14: HEALTHY LIVING

Cardiff will be made a healthier place to live by seeking to reduce health inequalities through encouraging healthy lifestyles, addressing the social determinants of health and providing accessible health care facilities. This will be achieved by supporting

developments which provide for active travel, accessible and useable green spaces, including allotments.

KP18: NATURAL RESOURCES:

In the interests of the long-term sustainable development of Cardiff, development proposals must take full account of the need to minimise impacts on the city's natural resources and minimise pollution, in particular the following elements.....minimising air pollution from industrial, domestic and road transportation sources and managing air quality.

EN13: AIR, NOISE, LIGHT POLLUTION AND LAND CONTAMINATION

Development will not be permitted where it would cause or result in unacceptable harm to health, local amenity, the character and quality of the countryside, or interests of nature conservation, landscape or built heritage importance because of air, noise, light pollution or the presence of unacceptable levels of land contamination.

C6: HEALTH

Priority in new developments will be given to reducing health inequalities and encouraging healthy lifestyles through:

- i. Identifying sites for new health facilities, reflecting the spatial distribution of need, ensuring they are accessible and have the potential to be shared by different service providers; and*
- ii. Ensuring that they provide a physical and built environment that supports interconnectivity, active travel choices, promotes healthy lifestyles and enhances road safety.*

The LDP also outlines the approach the Council will take to increase the proportion of people travelling by sustainable modes and to achieve the 50:50 modal split target.

This will involve:

- enabling people to access employment, essential services and community facilities by walking and cycling through, for example, high quality, sustainable design and measures to minimise vehicle speed and give priority to pedestrians and cyclists;
- developing strategic bus and rapid transit corridor enhancements and facilitating their integration with the wider transport network;
- facilitating the transfer between transport modes by, for example, improving existing interchanges and developing new facilities such as strategically located park and ride facilities; and
- maximising provision for sustainable travel within new developments and securing infrastructure investment which can support modal shift within existing settlements.

4.2.2 Replacement LDP

The Council agreed with Welsh Government in March 2021 a timetable to prepare a Replacement LDP to cover the period 2021 to 2036. The timetable proposes a 3.5 year preparation process with adoption of the Replacement LDP due at the end of 2024.

The first stage in preparation of the Replacement LDP was consultation on the Vision, Issues and Objectives for the plan which was completed in summer 2021. Following this consultation Cabinet and Council agreed a Vision and Objectives for the plan in September 2021. The agreed Vision and Objectives includes a commitment to create healthier environments, reduce inequalities and enhance wellbeing including specifically setting out how air quality can be enhanced. This agreed Vision and Objectives will set the context for the plan as it evolves in more detail through the preparation process over the next few years.

4.3 Local Transport Plans and Strategies

4.3.1 Transport White Paper

The Transport White Paper was launched on 15 January 2020 and lays out an ambitious 10- year plan to tackle the climate emergency, reduce congestion and improve air quality. It includes proposals for developing the South East Wales Metro, including new Metro lines connecting new and existing communities in the city, Rapid Bus Transport, Active Travel and improvements to our streets and the future of the car, including reducing car ownership through car clubs and greening through the expansion of EV charging infrastructure. Key regional projects are identified, with significant improvements proposed for all the major routes into the city. It also outlines the intention to consider all delivery options and to work with Welsh Government to develop a comprehensive investment plan. The timescale for the White Paper was amended in line with ongoing developments in relation to the Clean Air Plan to ensure alignment. The document is available at;

<https://www.cardiff.gov.uk/ENG/resident/Parking-roads-and-travel/transport-policies-plans/transport-white-paper/Documents/White%20Paper%20for%20Cardiff%20Transport%202019.pdf>

4.4 Active Travel Plans and Strategies

In September 2014, the Welsh Government introduced the Active Travel (Wales) Act. This measure legally requires Welsh local authorities to map and plan suitable routes for Active Travel within certain areas, as designated by the Welsh Government.

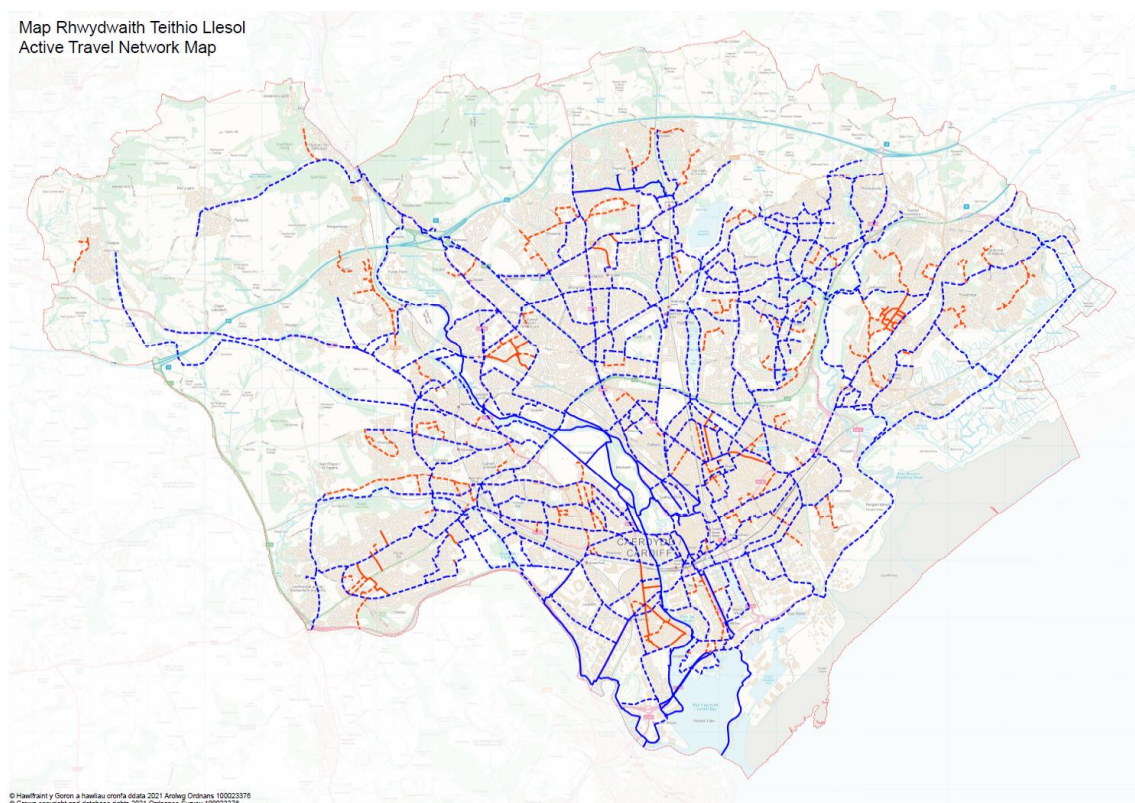
The Cardiff Cycling Strategy sets out an ambitious vision to double the number of cycling trips by 2026, from a 9.2% modal share in 2015 to 18.4% in 2026. In order to achieve this vision, it will be necessary to develop a comprehensive network of cycling infrastructure which is suitable for use by people of all ages and abilities, and to work with key partners from employers, retail and schools to ensure that appropriate cycling facilities are provided at destinations and to promote cycling.

In 2021 the Council commenced a detailed consultation on an updated draft Active Travel Network Map for Cardiff has been developed to take account of:

- Proposals to improve routes for walking and cycling set out in the Transport White Paper, including a network of segregated Cycleway routes;
- Routes required to connect strategic development sites to existing communities and key destinations, including the City Centre and Cardiff Bay; and
- Routes required to access important local destinations across the city, including schools and local shops

Analysis of the feedback received to the Commonplace engagement undertaken between November 2020 and January 2021, which identified additional locations where improvements for walking and/or cycling are required. A 12 week statutory consultation on the draft plan was undertaken by the CC between August and October 2021.

Figure 30 - Draft Active Travel Network Map



4.5 Local Authorities Well-being Objectives

In 2015 Welsh Government made a new law called the Well-being of Future Generations (WFG) (Wales) Act. The new law has the sustainable development principle at its heart. This means that we need to work in a way that improves wellbeing for people today without doing anything that could make things worse for future generations. There are seven national well-being goals that form the basis of the Act and five ways of working which support the goals.

CC adopts the principles of The Well-being of Future Generations (Wales) Act 2015. The Act is a significant enabler to improve air quality as it calls for sustainable cross-sector action based on the principles of long-term, prevention-focused integration, collaboration and involvement. It intends to improve economic, social, environmental and cultural well-being in Wales to ensure the

needs of the present are met without compromising the ability of future generations to meet their own needs.

4.5.1 Cardiff Well-Being Plan 2018-23

Under the WFG Act the Cardiff Public Services Board (PSB) has produced its Well-Being Plan for 2018- 2023, which sets out the Cardiff PSB's priorities for action over the next 5 years, and beyond. The Plan contains Well-being Objectives, high-level priorities that the Cardiff PSB have identified as being most important. It also contains 'Commitments,' or practical steps that the city's public services, together, will deliver over the next 5 years. The Well-Being Plan has set out Well-Being Objectives as follows:

- **Objective 1** - A Capital City that Works for Wales;
- **Objective 2** - Cardiff grows in a resilient way;
- **Objective 3** - Safe, Confident and Empowered Communities
- **Objective 4** - Cardiff is a great place to grow up;
- **Objective 5** - Supporting People out of poverty;
- **Objective 6** - Cardiff is a great place to grow older; and
- **Objective 7** - Modernising and Integrating Our Public Services

Within the Well-Being Plan Objective 2 details the following; *Cardiff is one of Britain's fastest growing cities, and is by far the fastest growing local authority area in Wales. Successful cities are those in which people want to live and this growth is welcomed and a sure sign of strength for the city. However, this growth will bring challenges too, putting pressure on both the city's physical infrastructures, community cohesion, its natural environment and public services. Managing the impacts of this population growth and of climate change in a resilient and sustainable fashion will be a major long term challenge for Cardiff.*

Improving levels of NO₂ and particulate matter (PM₁₀, 2.5) is a City level outcome indicator that the PSB will seek to impact in order to meet this specific Objective. The Plan forecasts a future Cardiff with improved air quality and has committed to taking 'a city-wide response to air pollution through supporting the development and delivery of a Cardiff Clean Air Strategy.

4.6 Green Infrastructure Plans and Strategies

Outlined in Cardiff's Local Development Plan (LDP) 2006- 2026, Policy **KP16** focuses upon Green infrastructure.

Policy KP16 Green Infrastructure

The policy aims to ensure that Cardiff's green infrastructure assets are strategically planned and delivered through a green infrastructure network. Other policies in the Plan provide more detailed guidance on aspects of these assets, together with supporting SPG.

Where development is permitted, planning conditions and/or obligations will be used to protect or enhance the natural heritage network.

New developments should incorporate new and / or enhanced green infrastructure of an appropriate size, type and standard to ensure no fragmentation or loss of connectivity.

Where the benefits of development outweigh the conservation interest, mitigation and/or compensation measures will be required to offset adverse effects and appropriate planning obligations sought. The implementation of policies designed to provide and protect public open space throughout Cardiff would also serve to offset any increase in recreational pressure on the Cardiff Beech Woods SAC, thereby helping to avoid likely significant effect upon that site.

Management of Cardiff's green infrastructure network should be in place prior to development, and appropriate planning obligations sought. SPG on this topic will more fully outline the extent of Cardiff's green infrastructure and how this policy can be implemented in more detail.

As previously mentioned a new Supplementary Planning Guidance (SPG) concerning Green Infrastructure was approved in 2017 by CC to provide a detailed understanding to the elements raised in the LDP.

- This document provides planning advice on a number of areas relating to development and the environment, including protection and provision of open space, ecology and biodiversity, trees, soils, public rights of way, and river corridors.
- The new document also differs from previous SPGs by providing more in depth design advice, aimed at giving developers a clearer understanding of the approach expected when submitting designs for new developments. By having this information up-front developers are better able to provide suitable designs to the Council through the planning process.

4.7 Climate Change Strategies

Cardiff Council declared a climate emergency in 2019 and has since been preparing the One Planet Strategy which sets out how we will respond and tackle this emergency and become carbon neutral Zero as a Council and a City by 2030. A draft One Planet strategy was published for consultation in October 2020 and public feedback on this, alongside a detailed analysis of the Council and city's current carbon position, have informed and shaped the final 2021 One Planet Cardiff Strategy report and action plan.

In producing the 2021 OPC Strategy the Council has completed a detailed carbon baselining and impact assessment. This key milestone has enabled an understanding of the current carbon position, both of Council operations and also of the wider City.

The OPC Strategy confirms the Council's commitment to ensuring that Cardiff will become a Carbon Neutral Council by 2030. It also confirms the Council's commitment to work in partnership with city wide stakeholders to determine a pathway to achieve a Carbon Neutral City by 2030. Full details of the final strategy are available at <https://www.oneplanetcardiff.co.uk/>

5 Conclusion and Proposed Actions

5.1 Conclusions from New Monitoring Data

Monitoring data for 2021 indicates that annual mean concentrations of nitrogen dioxide recorded at sites of relevant exposure within the already established AQMAs are compliant with the annual mean NO₂ Air Quality Standard (40µg/m³). The results are indicative that the impacts of the COVID lockdowns and restrictions at the beginning of 2021, and the subsequent behavioural changes once restrictions were lifted, may have influenced pollution levels in Cardiff in 2021. It is therefore likely that the concentrations recorded in 2021 are not representative of a true business as usual scenario and the results have generated a bias/ underestimation of levels of pollution across Cardiff in 2021.

Therefore, monitoring within the AQMAs has continued in 2022, consideration of any future actions for the AQMAs will be assessed by the Council once an assessment of the longer term recovery from Covid has been determined.

5.2 Conclusions relating to New Local Developments

SRS on behalf of Cardiff Council will continue to monitor data gathered by the developer's air quality consultants for Velindre Construction Access 20/01110/MJR, as part of planning condition 11.

Condition 11: Prior to commencement of the development hereby approved details of an air monitoring unit and its location shall be submitted to and approved in writing with the Local Planning Authority. The monitoring unit shall be implemented in accordance with the approved details and remain operational until cessation of the development. Data from the air monitoring unit shall be provided to the Local Planning Authority on request

5.3 Other Conclusions

The implementation of COVID measures in the City Centre accelerated the Council's achievement of compliance with limit values for NO₂ under the Ambient Air Quality Directive, on Castle Street. The Interim implementation of the Castle

Street Scheme as approved by Welsh Government, was completed at the end of October 2021. The Council has ensured ongoing monitoring has been undertaken. At the time of writing this report further assessments using updated traffic data, collected post Covid, is being undertaken so as the Council can undertake further detailed assessments in order to identify the most suitable permanent solution for Castle Street. The assessments will enable the Council to comply with the most recent legal direction from Welsh Government.

5.4 Proposed Actions

As a result of the information provided herein it is proposed to

1. Deliver and implement the proposed mitigation measures quantified within the Clean Air Plan;
2. Continue monitoring within and around the existing AQMAs and other areas of concern. The diffusion tube network appointed by SRS on behalf of Cardiff Council will be reviewed and an assessment on locations made;
3. Ensure implementation of the updated Realtime Monitoring Network is completed early 2023.
4. Continue to drive Air Quality as a major aspect to be considered during any planning applications, most importantly Cardiff Central Development;
5. Submit an Annual Progress Report (APR) in 2023; and
6. Update the existing Clean Air Strategy and Action Plan to represent most recent actions in 2023.

References

Department for Environment, Food and Rural Affairs, 2003. *Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III Local Air Quality Management, Technical Guidance LAQM.TG(16)*. London: DEFRA (August 2021).

Welsh Government, Local Air Quality Management in Wales, Policy Guidance, June 2017.

Cardiff Council 2021 Annual Progress Report

Cardiff Council Clean Air Plan 2019

Appendices

Appendix A: Monthly Diffusion Tube Monitoring Results

Appendix B: A Summary of Local Air Quality Management

Appendix C: Air Quality Monitoring Data QA/QC

Appendix D: AQMA Boundary Maps

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

Table 14 - Full Diffusion Tube Monthly Results 2021 (µg/m3)

WAQF Number 2021	Cardiff Council Site ID	Site Name	X (Easting)	Y (Northing)	Site Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave	Biased Adjusted & Annualised	
CCC-036	16	167 Ninian Park Road	317040	176060	Roadside	33.4	41.6	31.7	26.2	26.5	17.4	25.3	20.3	31.9	34.2	34.9	35.2	29.8	23.2	
CCC-083	258	Lampost outside 116 Penarth Road AQMESH Co-Location	317760	175310	Roadside	29	43.5	44.2	40.6	31.6	22.9	33.8	34.7	41.4	37.8	52.3	40.2	37.7	29.4	
CCC-092	58	Westgate Street	317937	176400	Kerbside	51.9	33.3	33.6	36.2	37.7	32.3	32.4	31.7	46.3	41.6	50.3	46.1	39.5	30.8	
CCC-115	81	Stephenson Court	319387	176980	Roadside	45.9	36.2	38.4	33.4	36	31	29.2	32.8	37.8	39	49.3	41.2	37.5	29.3	
CCC-120	86	19 Fair oak Road	318452	178805	Roadside	38.6	35.2	36.2	27.4	33.4	28	28.4	24.7	36.4	42.4	45.4	39	34.6	27.0	
CCC-130	96	Manor Way Junction	316601	179653	Roadside		32.5	29.5	35.5	32.2	24.4	25.6	24.5	27	32.8	40.8	36.6	31.0	24.2	
CCC-132	98	Western Avenue (Grenisies)	314805	177345	Roadside	25.4	28.3	25.2	25.8	26.2	22.3	22.2	20.1	29.1	28.7	31.9	34.1	26.6	20.8	
CCC-133	99	Cardiff Road Llandaff	315275	178117	Roadside	30.6	40.5	34.2	34.8	31.7	25.1	25.7	20.6	37.8	31.9	37	36.3	32.2	25.1	
CCC-135	101	Cardiff AURN	318416	176525	Urban Centre	26.6	20.2	20	16.6	13.1	14.4							18.6	14.1	
CCC-136	102	Cardiff AURN	318416	176525	Urban Centre	23.7	22.2	17.6	18	13.1	13							17.9	13.4	
CCC-137	103	Cardiff AURN	318416	176525	Urban Centre	26	19.1	20.2	18.3	11.9	13.2							18.1	13.5	
CCC-140	106	30 Caerphilly Road	316851	179520	Roadside	36.2	33.4	31.6	23.6	29.5	18.6	21.6	18	32.1	40.6	42.8	36.6	30.4	23.7	
CCC-146	112	17 Sloper Road	316613	175910	Roadside	31.1	36.2	26.8	29.2	27	23.5	21.6	25.6	35	30.1	39.7	29.4	29.6	23.1	
CCC-149	115	21 Llandaff Road	316604	176641	Roadside	34.1			30.1	34.5	25.9	29.9	23.9	21.7	42.6	46.7	38.5	32.8	25.6	
CCC-151	117	25 Cowbridge Road West	314458	176735	Roadside	46.3	53.1	43.4	48.2	42.5	36.3	37.6	36.3	60.5	45	49.2	48.1	45.5	35.5	
CCC-160	126	Westgate Street Flats	317946	176387	Roadside	30.1	24.3	28.7		30.3	26.1	28.4	27.1	35.1	35.4	40.7	34.2	30.9	24.1	
CCC-162	128	117 Tudor Street	317540	175979	Roadside	36.8	37.1	35.7	26	28.4	20.8	28.8	21.2	36.3	39.2	38.4	38.3	32.3	25.2	
CCC-165	131	Dragon Court	319292	176932	Roadside	38.9	34.9	37.1	34.8	37.9	6.9	29.8	34	36.7	36.6	48.4	34.8	34.2	26.7	
CCC-177	143	Windsor House	318009	176337	Roadside	36.2	25.6	29.8	27.6	27.2	27.5	31.7	29.9	41.1	38.7	43.9	35.6	32.9	25.7	
CCC-178	144	Marlborough House	318046	176307	Roadside				29.2	31	34.6	31.8	33	24.6	40.4	39.5		33.8	26.4	
CCC-181	147	211 Penarth Road	317636	175161	Roadside	35.5	32.6	31.2	35.5	29.3	23	22.3	22.9	33.7	31	38.2	30.2	30.5	23.8	
CCC-182	148	161 Clare Road	317695	175389	Roadside	30.6	35.3	31.9	36.5	28.3	24	28.4	23.2	33.5	28.6	37.5	30.4	30.7	23.9	
CCC-183	149	10 Corporation Road	317764	175174	Roadside	34.9	32	36.4	34.9	32.7	25.6	31.6	25.7	30.7	38.7	45.8	29.3	33.2	25.9	
CCC-190	156	2a/4 Colum Road	317997	177412	Roadside	25.6	27.3	26.5	25.8	25.2	19.9	19.5	20.9		26.8	34.1	31.4	25.7	20.1	
CCC-191	157	47 Birchgrove Road	316605	179703	Roadside	25.9	27	25.2	20	24.5	15.1	19.2	15	34.1	28.2	33.7	30.3	24.9	19.4	
CCC-192	158	64/ 66 Cathays Terrace	318093	177716	Roadside	30.4	30.1	28	24.4	24.2	20.7	19.8	17	30.2	28.3	36.5	32.9	26.9	21.0	
CCC-193	159	IMQ facade Replacement	320709	177918	Roadside	30.3	35.5	34.6	35.9	36.2	25.6	31.4	28.7	40.1	39.1	44.3	39.8	35.1	27.4	
CCC-200	166	163 Lansdowne Road	315950	176424	Roadside	40.6	38.7	27	32.4	37	29.5	33.3	15.2	34.5	40.5	43.3	38	34.2	26.7	
CCC-202	168	170 Cowbridge Road East	314856	176929	Roadside	30.9	30.6	28.4	29.6	25.7	24.4	25.2	24.8	32.9	28.1	36.8	31.7	29.1	22.7	
CCC-208	174	76 North Road	317508	177868	Kerbside	24.8	24.8	27	21.9	22.5	18.1	19.7	19.2	29.4	31.5	36.8	32.3	25.7	20.0	
CCC-213	179	Altolusso, Bute Terrace	318627	176039	Roadside	56.4	31.6	47.9	48.3	41.2	45	47.1	42.8	53.4	48.8	60.2	55.9	48.2	37.6	
CCC-217	183	Station Terrace	318765	176623	Kerbside	36.5	27.9	28.7	28.9	28	20.4	23.8	26.1	37.4	32.1	38.4	36.9	30.4	23.7	
CCC-218	184	Hophouse, St Mary Street	318335	176074	Roadside	45.4	37.5	33.7	42.3	39.2				45.1		40.3	43.1	40.8	27.5	
CCC-220	186	Dempsey's Public House, Castle Street	318044	176449	Roadside	33.1				27.6	22.9	27	23.2	34			43.8	30.2	24.5	
CCC-221	187	Angel Hotel	317944	176436	Roadside	16.6	28.6	26.2		34	26.4	32	30.4	37.3	42.8	46.7	47.3	33.5	26.1	
CCC-222	188	Westgate Street (45 Apartments)	318229	176154	Roadside	47.3		38.2									43.4	40.3	41.8	26.8
CCC-224	191	7 Mackintosh Place	318724	177776	Roadside	29.3	31.9	30.4	25.2	29.4	24	27.4	21.9	34	41.1	40.7	37.9	31.1	24.3	
CCC-227	194	115 Cowbridge Road West	313870	176212	Roadside	27.8	24.7	23.5	21.1	18.6	19.3	17.3	23.1	24.7	22.1	32.1	28.3	23.6	18.4	
CCC-228	195	244 Newport Road	320147	177523	Roadside	38.8	29.8	27.3	30	31	25.1	29.2	14.6	36.3	39.5	39.8	36.5	31.5	24.6	
CCC-229	196	2 Pencisely Road	316223	177305	Roadside	29.9	33.5	24.7	29.6	26.3	20.1	21.4	20.7	31.4	33.2	34.7	33.3	28.2	22.0	
CCC-231	198	Next Building to Stephenson Court	319348	176958	Roadside	37.3	30.8	34	32.4	29.1	35.6	35.7	40.5	38.7	38.6	49.3	39.5	36.8	28.7	
CCC-232	199	157 Newport Road	319599	177174	Roadside	30.8	23.4	27.6	22	23.5	14.7	20.4	21.4	26.8	29.8	37	31.6	25.8	20.1	
CCC-233	200	350 Whitchurch Road	317038	179073	Roadside	42.1	33.5	33.8	34.6	29.2	30.7	27.8	28.8	36.3	38.3	48.7	38.4	35.2	27.4	
CCC-234	201	23 Lower Cathedral Road	317547	176411	Roadside	38.5		28.9	29.5	23.5	18.3		21.7	32.5	33.5	41.5	39.9	30.8	24.0	
CCC-235	202	22 Clare Street	317604	176053	Roadside	33.2	37.1	30.2	30.5	31.6	20.7	25.3	17.9	38.8	36.9	36.2	39	31.5	24.5	
CCC-236	203	10 Fair oak Road	318255	178533	Roadside	20.8	24.8	22.4	19.8	19.9	16.7	18.1	15.5	23.3	25.3	29.7	26.5	21.9	17.1	
CCC-237	204	53 Neville Street	317487	176303	Roadside	32.9	28.8	24.6	23.9	21.2	15.6		16.8	28.2	29.6	32.5	29.7	25.8	20.1	
CCC-240	207	42 Waungron Road	314769	177343	Roadside	30.3	32	24.8	20	21.2	17	18.2	16.3	23.2	24.2	29.5	25.6	23.5	18.3	
CCC-241	208	2 Llantrisant Road	315152	178245	Roadside	28.4	30.2	24.9	24.4	24.2	19.9	21.7	16.2	28.6	34.4	33	29.4	26.3	20.5	
CCC-242	209	178 North Road	317200	178537	Roadside	23.5	21.5	20.7	20.6	17.4	13.3	16.8	15.3	24.3	25.4	30.5	25.9	21.3	16.6	
CCC-243	210	485 Caerphilly Road	316692	181088	Roadside	27	26.2	24	19.8	18.2	16.1	17.7	15.2	23.1	25.4	31.7	25.2	22.5	17.5	
CCC-244	211	19 West Wood Close, Penylan	320247	178903	Roadside	52		25.6	18.3	22.8	17.1	18.4	13.6	26.4	27.8	27.6	28.2	25.3	19.7	
CCC-245	212	Bridge Road	315197	178221	Kerbside	49.6	60.5	38	52.1	48.2	38.7	31.8		55.3	49.3	55.3	48.2	47.9	37.4	
CCC-267	214	Mitre Place	315254	178153	Roadside	36	39.5	31.9	32.5	36.1	24.1	28.8	15.1	36.4	38.1	37.9	34.9	32.6	25.4	
CCC-271	218	16-18 Cowbridge Road West	314471	176889	Roadside	42.2	40	37	43.5	38.7	36.5	36.2	32.7	42.7	42.3	52.5	41.2	40.5	31.6	
CCC-288	254	Giraffe Nursery Cathedral road	317529	176340	Roadside	38.6	39.7	33.9	30.8	35.9	21.8	32	30.8		41.1	41.6	44.8	35.5	27.7	
CCC-273	220	Fitzalan Court Newport Road	318955	176823	Kerbside	49.5	35	37.6		38.9	35.7			49	44.2	46.2		42.0	30.4	
CCC-274	221	Stuttgarter Strasse (New student flats)	318530	177468	Kerbside	43.6	31.1	35.2	34.5			36.8	30.1					35.2	26.9	
CCC-223	190	3 Pearson Street	313668	177738	Roadside	36.7	26.3	27.4	19.1	16.8	18.9	21.7	13.7	25.9	31.5	38.7	33	25.8	20.1	
CCC-277	224	110 Cardiff Road	315714	177740	Roadside	29.8	28.9	23.7		21.3	18.1	18.7	18.2	25.2	23.5	31.7	26.6	24.2	18.8	
CCC-278	243	25 Cardiff Road	315712	178789	Kerbside	28.1	36.7	34.7	32.2	34.6	26.1	33.5	25.5	40.1	50.6	50	41.1	36.1	28.2	
CCC-279	244	25 Bridge Road	314910	176584	Roadside	20.5	20.1	24.6	24.9	18.4	17.8		15.2	24.5	24.9	34.8	27.5	23.0	18.0	
CCC-280	245	47 Willows Ave	321006	179081	Urban Background	24.4	20.2	19.7	15.9	16.3	13.6	13.4	13.6	17.3	25	28.4	22.9	19.2	15.0	
CCC-281	247	Radyr Primary school	312869	1803738		17	18			11.4	11	10.7	10.8	15.5	14.3	20	17.6	14.6	11.4	
CCC-283	249	Wentloog Road, Runcry	321709	176022	Roadside	25.5	23.1	24.2	18.6	18.5	16.5	12.8	14.9	20.4	22.6	29.9	26.3	21.1	16.5	
CCC-284	250	Central Square Cardiff, City Centre	318201	180367	Roadside	37	37.5	30	38.2	36.9	31.1	31.9	29.1	44	37.6	42.6	40.7	36.4	28.4	
CCC-275	251	Heol Isaf, Radyr	313244	17876																

Site Number	Nitrogen Dioxide Sites, Cardiff TRO Project Schools	Grid Ref	Class	Distance of measurement from Kerb (m)	Distance from Kerb to Receptor	06/01/2021 - 03/02/2021	02/02/2021 - 03/03/2021	03/03/2021 - 29/03/2021	29/03/2021 - 04/05/2021	04/05/2021 - 01/06/2021	01/06/2021 - 01/07/2021	01/07/2021 - 02/08/2021	02/08/2021 - 01/09/2021	01/09/2021 - 27/09/2021	27/09/2021 - 04/11/2021	04/11/2021 - 03/12/2021	03/12/2021 - 05/01/2022	AVERAGE SINCE Jan 21	Bias Corrected and annualised (Correction Factor 0.78)	Percentage of Data Capture
TRO-001	Whitchurch High Lower School	ST 15621 80320	Roadside	20.00	20.00		19.1	14.7	17					15	16	23.1	18	17.6	11.9	58
TRO-002	Glan-Y-Nant Terrace (inside TRO zone)	ST 15589 80316	Roadside	1.00	1.00	32.5	18.9	18.3	14.8	11.7	11.4	11.8	11.4	15.5	16.7	23.8	20.1	17.2	13.4	100
TRO-003	Cross roads of Old Church Rd and Glan-Y-Nant terr (outside TRO zone)	ST 15548 80315	Roadside	1.00	3.00	30.2	23.4	19.5	20.1		14.1	14.9	13.9	17.9	22.3	24.5	24.5	20.5	16.0	92
TRO-004	Ysgol Melin Gruffydd School	ST 15620 80160	Roadside	2.00	4.00	21.8	17.7	15.8	14.5	7.9	9.8		8.5	15.1		21.3	20.1	15.3	11.9	83
TRO-005	34 Glan-Y-Nant Rd (inside TRO zone)	ST 15608 80151	Roadside	3.00	3.00	19.8	17.7	16.4	14.7	11.5	9.3	10.7	9.2	13.4	16.3	21.2	18.3	14.9	11.6	100
TRO-006	36 Old Church Rd (outside TRO zone)	ST 15497 80140	Kerbside	1.00	1.00	29.3	25.7	22.2	23.7	18.1	16.9	16.9		22	24.4	15.1	25.8	21.8	17.0	92
TRO-007	Peter Lea Primary	ST 13878 78319	Roadside	5.00	5.00	18.8	14.8		13	8.6	9.8	9.5	8.7	12.2	14.2	18.9	18.2	13.3	10.4	92
TRO-008	36 Carter Place (inside TRO zone)	ST 13894 78331	Roadside	4.00	4.00	17.3	11.6	11.3	12.3	6.8	6.4	8	6.2	10.3	11.7	15.1	14.6	11.0	8.6	100
TRO-009	3 Carter Place (outside TRO zone)	ST 14022 78334	Roadside	4.00	4.00	17.6	15.5	11	13.4	8.1	8.2	6.9	6.6	11.3	11.1	16.1	16.2	11.8	9.2	100
TRO-010	Llandaff Church in Wales Primary	ST 15274 77784	Roadside	5.00	5.00			15.3	14.1	9.7	9.2	10.0	8	12.7	17	22	17.6	13.6	10.6	83
TRO-011	Hendre Close Llandaff (inside TRO zone)	ST 15279 77750	Roadside	1.00	5.00	15.5	19.9	16.9	15.1	8.8	9	11	9.3	7.2	14	20	20.3	13.9	10.9	100
TRO-012	48 Hendre Gardens Llandaff (outside TRO zone)	ST 15209 77668	Roadside	4.00	4.00	17.4	17.9	15.3	14.2	9.6	8.1	9.9	9	6.6	14.7	18.9	18.6	13.4	10.4	100
TRO-013	Pencaer School	ST 12803 75519	Roadside	5.00	5.00	18.4		15.9	12.9	9.2	8.8	7.7	7.3	10.6	10.1	12.6	13.4	11.5	9.0	92
TRO-014	16 Cynntwell Avenue (inside TRO zone)	ST 12809 75496	Roadside	4.00	4.00	45	14.6		15.2	12.7	8.6	9.5	10.3				16.6	13.7	58	
TRO-015	6A Cynntwell Avenue (outside TRO zone)	ST 12734 75411	Roadside	3.00	3.00	21	16.5	20.2	14.1	11.3	10.1	11.4	9.8	14.5	15.5	21.5	16.4	15.2	11.8	100
TRO-016	Lansdowne Primary School	ST 15801 76568	Roadside	2.00	2.00	30.3	14.6	20.2	20.6	14.6	14.3	15.0	13.8	21.1	24.3	30.4	25.9	20.4	15.9	100
TRO-017	29 Norfolk St (inside TRO zone)	ST 15811 76555	Roadside	3.00	3.00	32.1	12.2	17.4	20.1	14.1	12.6	14.5	14.2	21.8	23.5	29.4	35.7	20.6	16.1	100
TRO-018	209 Llandowne Rd (outside TRO zone)	ST 15801 76492	Roadside	3.00	3.00	35.1	25.6	32.4	29.1	26.7	24.0	27.3	23.3	31.1	38.5	40.9	24.5	29.9	23.3	100
TRO-019	St Cuthberts School	ST 19027 75490	Kerbside	2.00	5.00	21.6	19.4	19.8	19.6	15.3	14.6	14.6	13	19.7	18.4	27.9	21.7	18.5	14.5	100
TRO-020	Letton Road (inside TRO Zone)	ST 18990 75480	Roadside	2.00	2.00	27.4	19.3			14.6		11.9	20.8	18.9	31.4	20.9	20.6	14.7	67	
TRO-021	58 Letton Road (Outside TRO Zone)	ST 18908 75456	Kerbside	2.00	3.00	30.5	23.2	23.3	24	17	16.3	16.4	14.9	23	22.1	32	26.6	22.1	17.2	100
TRO-022	Tredegarville School	ST 19263 76807	Roadside	5.00	5.00	29.8	24.5	21.3	21.8	19.2	17.8	31.6		23.9	27.3	30.1	27.3	24.7	19.3	92
TRO-023	Newport Road Lane (inside TRO Zone)	ST 19217 76776	Kerbside	1.00	2.00	34.2	28.2	25.6	22.7	18.8	17.6	17.6	18.5	26.5	27	38.2	26.3	25.0	19.5	100
TRO-024	Glossops Road (Outside TRO Zone)	ST 19271 76833	Kerbside	1.00	20.00	45.2	39.6	33.2	31.9	35.1	30.7	32	34	41.4	43.6	50.9		38.0	29.6	92
TRO-025	St Peters School	ST 19395 77098	Kerbside	2.00	10.00	29.3	23.9	20.2	20.1	17.3	11.8	12.6	12.1	18	22.2	28.9	26.6	19.7	15.3	100
TRO-026	Southey Street (inside TRO Zone)	ST 19376 77086	Kerbside	1.00	3.00	29.4	18.3	19.5	19.2	16.3	11.7	13.2	13.9	19.9	22.6	25.1	14.1	19.0	14.8	100
TRO-027	Wordsworth Avenue (Outside TRO Zone)	ST 19338 77063	Kerbside	1.00	3.00	26.9	26.6	21	20.7	16.7	15.2	14.8	15.6	21.3	24.7	27.8	29.4	21.0	16.4	100
TRO-028	St Monica's / Gladstone School	ST 17989 78182	Roadside	3.00	3.00	23.2	20.7	16.2	17.4	11.6	13.1	8.3	9.7	20	21.1	28.2	29.1	17.2	13.4	100
TRO-029	3 Pentyrch Street (inside TRO Zone)	ST 17983 78158	Kerbside	1.00	3.00	28.6	23.9	21	21	13.3	12.2	12.2	10.9	16	18.5	24.9	21.9	18.4	14.4	100
TRO-030	Cwmddare Street (Outside TRO Zone)	ST 17860 78302	Kerbside	1.00	3.00	26	17.7	17.5	16.8	13.9	10.8	12.6	12	18.3	21.2	27.6	24.4	17.7	13.8	100
TRO-031	Lakeside School	ST 19045 79937	Roadside	5.00	5.00	24.5	17.4	14.2	13.6	10.4	10.5	9.5	6.3	12.8	15.4		16.6	13.5	10.5	92
TRO-032	Ontario Way (inside TRO Zone)	ST 19040 80023	Kerbside	1.00	2.00	20.6	15.3	11.1	11.9	9.9	8.9	8.8	9.2	12.4	14.6	18.4	17.3	12.8	10.0	100
TRO-033	Woolaston Avenue (Outside TRO Zone)	ST 18907 80015	Kerbside	1.00	3.00	22.1	17	13.7	11.7	11.1	12.2	8.4	8.3	13.8	16.5	21.5	19	14.2	11.1	100
TRO-034	Bryn Hafod School	ST 21817 80407	Kerbside	2.00	10.00	22.7	19.8		12.4	7.5	9.1	7.9	7.3	10.8	14.8	19.3		13.2	10.3	83
TRO-035	8 Blagdon Close (inside TRO Zone)	ST 21869 80400	Kerbside	1.00	3.00	22.5		15.7	13.8	7.6	10.5	9.4	7.4	14.9	17.1	23.2	19.9	14.2	11.1	92
TRO-036	Uphill Road (Outside TRO Zone)	ST 21825 80317	Kerbside	1.00	3.00	21.4	19.9	14.6	13.6		9.9	10	9.5					14.1	11.3	58
TRO-037	Glan Yr Afon School	ST 21703 81427	Kerbside	2.00	5.00						7.9					2.5		5.2	4.1	17
TRO-038	Browning Close School Zone (inside TRO Zone)	ST 21760 81378	Kerbside	1.00	3.00	24.6		17.1	15.4	6.7	9.4	10.5	10.4	13.6	18	25.3	20.7	15.1	11.8	92
TRO-039	Lampost 65 Thackeray Crescent (Outside TRO Zone)	ST 21835 81275	Kerbside	1.00	3.00	24.9		17.8	16.6	13.8	10		11.1	15.6	18.9	26.1	21.1	17.2	13.4	83
TRO-040	Willow Brook School	ST 24492 80958	Kerbside	2.00	5.00	19.6	18.4	15.5	16.3	10				15.1	16.2	23.9	18.3	16.9	13.2	75
TRO-041	Bullrush Close (inside TRO Zone)	ST 24519 80947	Kerbside	1.00	3.00	25.3	16.5	15.2	15.8	8.6	10.2	12.8	8.7	13.4	14.8	20.6	18.5	14.7	11.5	100
TRO-042	Sandbrook Road (Outside TRO Zone)	ST 24514 80975	Kerbside	1.00	3.00	27	19.8	15.5	13		15	11.7	11.1	16.6		24.6	19.7	17.1	13.4	83
TRO-043	Creigiau School	ST 07903 81561	Kerbside	2.00	5.00	16.5	7.8	11.2	10	7.6	7.6	6.5	6	9.6	11.2	17.9	11.4	10.2	7.9	100
TRO-044	Tregarth Court (inside TRO Zone)	ST 07914 81574	Kerbside	1.00	3.00	14.5	13.3	11	8.1	7.7	7.7	6.5	7	10.1	10.1	16.8	11.1	10.3	8.0	100
TRO-045	Ty - nant Road (Outside TRO Zone)	ST 07968 81577	Kerbside	1.00	3.00	16.1	14.4	11.7	14.3	13	13	9.9	9.7	12.8	13.3	22.9	14.5	13.7	10.7	100

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to the nearest relevant public exposure

Appendix B: A Summary of Local Air Quality Management

Purpose of an Annual Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in the Environment Act 1995 and associated government guidance. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas and to determine whether or not the air quality objectives are being achieved. Where exceedances occur, or are likely to occur, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) within 18 months of declaration setting out the measures it intends to put in place in pursuit of the objectives. Action plans should then be reviewed and updated where necessary at least every five years.

For Local Authorities in Wales, an Annual Progress Report replaces all other formal reporting requirements and have a very clear purpose of updating the general public on air quality, including what ongoing actions are being taken locally to improve it if necessary.

Air Quality Objectives

The air quality objectives applicable to LAQM in Wales are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138), Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298), and are shown in Table 15.

The table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

Table 15 - Air Quality Objectives Included in Regulations for the Purpose of LAQM in Wales

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as	Date to be achieved by
Nitrogen Dioxide (NO₂)	200µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
Nitrogen Dioxide (NO₂)	40µg/m ³	Annual mean	31.12.2005
Particulate Matter (PM₁₀)	50µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean	31.12.2010
Particulate Matter (PM₁₀)	40µg/m ³	Annual mean	31.12.2010
Sulphur dioxide (SO₂)	350µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
Sulphur dioxide (SO₂)	125µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
Sulphur dioxide (SO₂)	266µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	16.25µg/m ³	Running annual mean	31.12.2003
Benzene	5µg/m ³	Annual mean	31 12 2010
1,3 Butadiene	2.25µg/m ³	Running annual mean	31.12.2003
Carbon Monoxide	10.0mg/m ³	Maximum Daily Running 8-Hour mean	31.12.2003
Lead	0.25µg/m ³	Annual Mean	31.12.2008

Appendix C: Air Quality Monitoring Data QA/QC

QA/QC of Diffusion Tube Monitoring

Diffusion Tube Bias Adjustment Factors

A database of bias adjustment factors determined from Local Authority co-location studies throughout the UK has been collated by the LAQM Helpdesk. The National Diffusion Tube Bias Adjustment Factor Spreadsheet (Version 06/21) was used to obtain an overall adjustment factor of 0.78 from the input data shown in the following screenshot. This overall factor is based on 24 co-location studies where the tube preparation method and analysis laboratory used were the same as those used by CC.

National Diffusion Tube Bias Adjustment Factor Spreadsheet						Spreadsheet Version Number: 06/21				
Follow the steps below in the correct order to show the results of relevant co-location studies								This spreadsheet will be updated at the end of Sept 2021		
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods										
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet										
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.								LAQM Helpdesk Version 1		
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.						Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.				
Step 1:		Step 2:	Step 3:	Step 4:						
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor ⁵ shown in blue at the foot of the final column.						
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data ²	If you have your own co-location study then see footnote ⁴ . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953						
Analysed By ¹	Method ³	Year ²	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ⁶	Bias Adjustment Factor (A) (Cm/Dm)
SOCOTEC Didcot	50% TEA in acetone	2020	R	East Suffolk Council	12	30	25	19.6%	G	0.84
SOCOTEC Didcot	50% TEA in acetone	2020	UB	Canterbury City Council	10	13	10	28.1%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	Canterbury City Council	9	26	20	29.6%	G	0.77
SOCOTEC Didcot	50% TEA in acetone	2020	UB	Kingston upon Hull City Council	12	24	18	34.8%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	R	Ipswich Borough Council	12	27	21	28.5%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	Ipswich Borough Council	12	36	26	36.3%	G	0.73
SOCOTEC Didcot	50% TEA in acetone	2020	R	Thanet District Council	9	20	17	21.2%	G	0.83
SOCOTEC Didcot	50% TEA in acetone	2020	R	Medway Council	12	26	18	41.7%	G	0.71
SOCOTEC Didcot	50% TEA in acetone	2020	B	Medway Council	11	20	10	96.3%	G	0.51
SOCOTEC Didcot	50% TEA in acetone	2020	B	Gravesham Borough Council	12	23	22	5.6%	G	0.95
SOCOTEC Didcot	50% TEA in acetone	2020	B	Gravesham Borough Council	12	27	24	16.1%	G	0.86
SOCOTEC Didcot	50% TEA in acetone	2020	R	Monmouthshire County Council	10	32	24	35.3%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	UI	North Lincolnshire Council	13	18	14	26.6%	G	0.79
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	12	24	19	29.0%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	11	22	17	34.3%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	12	33	23	40.4%	G	0.71
SOCOTEC Didcot	50% TEA in acetone	2020	R	Cambridge City Council	10	30	20	47.6%	G	0.68
SOCOTEC Didcot	50% TEA in acetone	2020	R	Wrexham County Borough Council	9	17	13	26.6%	G	0.79
SOCOTEC Didcot	50% TEA in acetone	2020	KS	Marylebone Road Intercomparison	11	59	43	38.0%	G	0.72
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	10	23	23	2.2%	G	0.98
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	12	22	19	18.6%	G	0.84
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	9	25	18	42.0%	G	0.70
Socotec Didcot	50% TEA in acetone	2020	R	Dacorum Borough Council	10	24	19	25.2%	G	0.80
Socotec Didcot	50% TEA in acetone	2020	R	Huntingdonshire District Council	12	36	25	47.1%	G	0.68
SOCOTEC Didcot	50% TEA in acetone	2020	Overall Factor ⁷ (24 studies)						Use	0.76

Discussion of Choice of Factor to use

The bias adjustment factor applied to all 2021 data is 0.78. The applied bias adjustment factor has been calculated using the national diffusion tube bias adjustment factor spreadsheet version 03/22.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes are supplied and analysed by Socotec UK Ltd Didcot, using the 50% triethanolamine (TEA) in water method. Socotec UK Ltd Didcot participates in the Annual Field Inter-Comparison Exercise and Workplace Analysis Scheme for Proficiency (WASP) inter-comparison scheme for nitrogen dioxide diffusion tube analysis. From April 2014 the WASP Scheme was combined with the STACKS scheme to form the new AIR scheme, which Socotec UK Ltd Didcot participates in. The AIR scheme is an independent analytical proficiency testing scheme operated by LGC Standards and supported by the Health and Safety Laboratory (HSL).

The laboratory Socotec UK Ltd Didcot is regarded ranked as the highest rank of satisfactory in relation to the WASP intercomparison scheme for spiked nitrogen dioxide diffusion tubes. Information regarding tube precision can be obtained via <http://laqm.defra.gov.uk/diffusion-tubes/precision.html> Information regarding WASP results can be obtained via <http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html>

Table 16 - Bias Adjustment Factor

Year	Local or National	National Reference	Adjustment Factor
2021	National	03/22	0.78
2020	National	09/20	0.76
2019	National	06/19	0.75

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within the Vale of Glamorgan required distance correction during 2021.

PM₁₀ and PM_{2.5} Monitoring Adjustment

The PM monitors at the Cardiff AURN sites and the Castle Street automatic monitor use Beta Attenuation Monitor (BAM) with gravimetric equivalence. Therefore, to present the data as gravimetric equivalence, a conversion factor of 0.83 has been applied, using the European Standards.

Automatic Monitoring Annualisation

There are no automatic monitoring locations that required annualization during 2021.

NO₂ Fall-off with Distance from the Road

No automatic NO₂ monitoring locations within the Cardiff area required distance correction during 2021.

Table 17 - Annualisation Summary (concentrations presented in µg/m³)

Diffusion Tube ID	Annualisation Factor Cardiff City Centre AURN	Annualisation Factor St Julians School, Newport	Average Annualisation Factor
101	0.9350	0.9821	0.9585
102	0.9350	0.9821	0.9585
103	0.9350	0.9821	0.9585
184	0.8333	0.8939	0.8636
186	1.0234	1.0586	1.0410
188	0.7853	0.8612	0.8233
220	0.9008	0.9537	0.9272
221	0.9465	1.0133	0.9799
TRO-001	0.8332	0.9100	0.8716
TRO-020	0.8782	0.9491	0.9136
TRO-036	0.9907	1.0541	1.0224
TRO-014	1.0473	1.0806	1.0640

Appendix D: AQMA Boundary Maps

Figure 31 - Cardiff City Centre AQMA



Figure 32 - Stephenson Court AQMA



Figure 33 - Ely Bridge AQMA



Figure 34 - Llandaff AQMA



Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide